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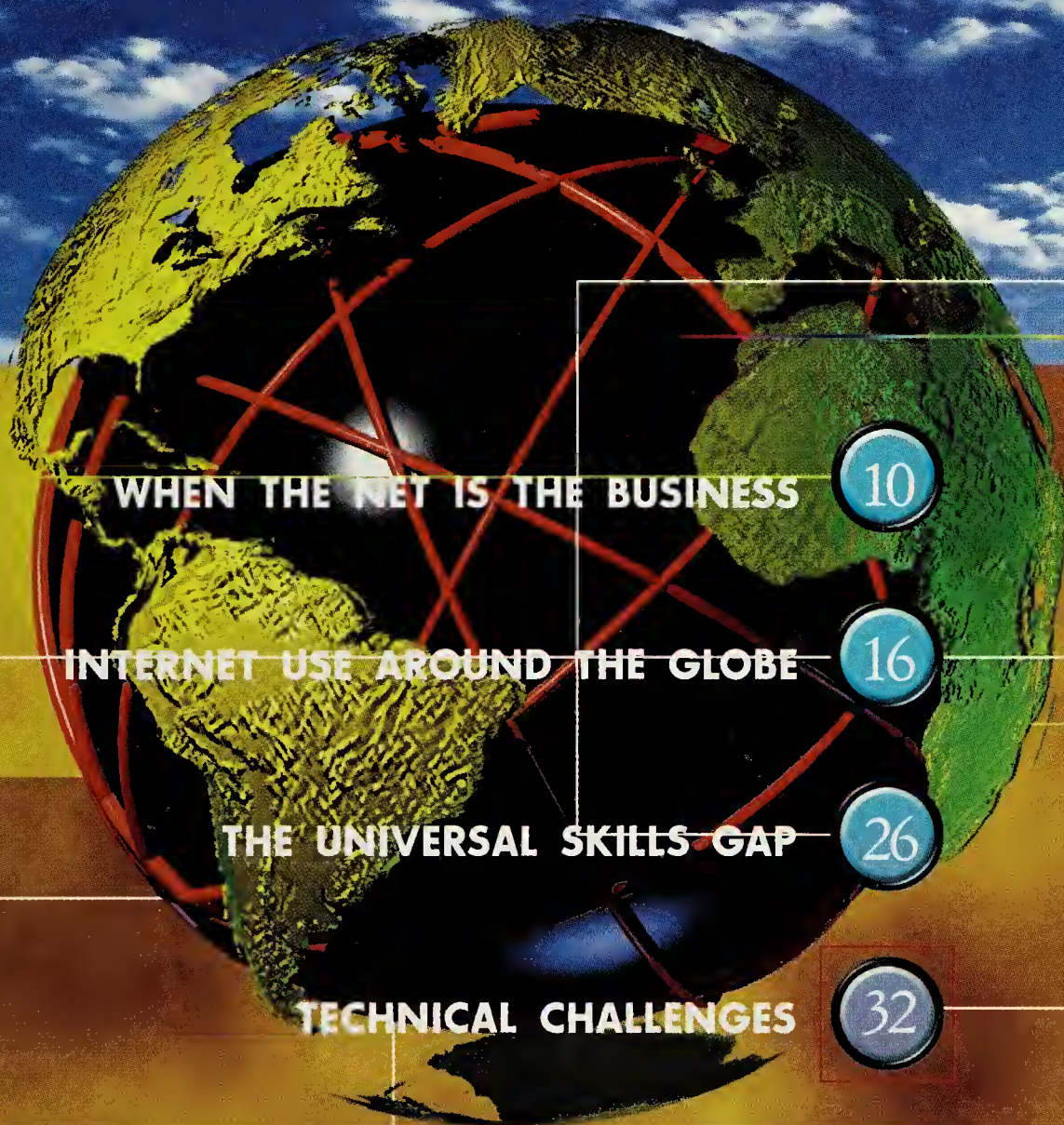
The Network 25

AN INTERNATIONAL COMPENDIUM OF NETWORK-SAVVY ORGANIZATIONS

Leadership³

Satisfying
the world's toughest
customers

3Com is proud to sponsor the 1997 Network 25 magazine. This Computerworld publication profiles organizations building the kind of network infrastructure necessary for business success in the 21st century. The rapidly escalating use of Internet and related technology brings a new imperative to network architects. The companies Computerworld has named to this list are some of the best and the brightest in IT leadership around the world. Their profiles provide valuable peer reference as you move toward your own goals.

In the following pages you'll learn how 25 leading organizations across the globe are adopting — and adapting — the Internet and intranets into the vital operations of their business.

While this marks the second year of 3Com sponsorship, in many ways 3Com is a brand new company. Our now-completed merger with U.S. Robotics created a $7 billion global presence, uniquely offering strengths from the edge to the heart of the network. No other company offers this breadth of product and depth of networking knowledge.

This merger allowed us to exercise our own commitment to networking's fundamental role within our business. Like any other firm profiled within these pages, 3Com had to meet our own set of challenges — from the smooth, virtually overnight e-mail consolidation of 13,000 employees, to the worldwide sharing of business information via a common intranet.

Our performance also had to meet the expectations of some of the world's most sophisticated network experts — our employees. Perhaps you'll see us in next year's Network 25 as a success story too.

I sincerely hope the examples within this supplement help you understand and solve your own network challenges — and that you look to 3Com as a willing partner in those efforts.

Eric Benhamou
President and Chairman of the Board, 3Com Corporation

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The Network 25

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AN INTERNATIONAL COMPENDIUM OF NETWORK-SAVVY ORGANIZATIONS

" *We've had nothing but great experience with 3Com equipment, so choosing them as a partner was easy.* "

—John Palmieri
Senior Network Administrator, PointCast Inc.

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From the editor

TURNING NETWORK NODES INTO MOTHER LODES

NETWORKS ARE THE LIFEBLOOD OF CUTTING-EDGE ORGANIZATIONS. BUSINESSES WOULD GRIND TO A HALT WITHOUT VITAL KERNELS OF INFORMATION PULSATING THROUGH TWISTED PAIRS OF COPPER AND FIBER-OPTIC WIRES. ONE LOOK AT SUCCESSFUL COMPANIES THROUGHOUT THE PACIFIC RIM, EUROPE, THE AMERICAS AND THE ISLAND CONTINENT OF AUSTRALIA MAKES THAT CLEAR.

AROUND THE GLOBE, WORKGROUP LANs HAVE GROWN INTO DEPARTMENTAL NETWORKS. MANY HAVE BEEN SPLICED INTO ENTERPRISE WANs SPANNING CAMPUSES, COUNTRIES, EVEN THE GLOBE. SHARED-FILE AND COMPUTING SERVICES HAVE TRANS-MOGRIFIED INTO COLLABORATIVE APPLI-CATIONS THROUGH WHICH E-MAIL, WORK SCHEDULES, SPREADSHEETS, WORD PROCESSING DOCUMENTS, VOICE, VIDEO AND IMAGES ARE PASSED AROUND AS EASILY AS GOSSIP BETWEEN CO-WORKERS.

OR AT LEAST IT SEEMS THAT WAY, WHEN NETWORKS WORK.

NETWORKING IS NOT EASY, WHETHER IT IS ACROSS THE HALL OR THE GLOBE. DESPITE EVOLVING STANDARDS AND GLOBAL TELECOM DEREGULATION, THERE ARE PLENTY OF ISSUES STILL PLAGUING ORGANIZATIONS AND THEIR NETWORKS AROUND MANY REGIONS OF THE WORLD: PROHIBITIVE COSTS, LIMITED BANDWIDTH, UNSTABLE AND LIMITED ACCESS AND A DEARTH OF SKILLS. THE ONLY CONSTANT IS THE NEVER-ENDING BATTLE TO OVERCOME THESE OBSTACLES AND TRANSFORM NETWORK NODES INTO MOTHER LODES OF KNOWLEDGE.

OUR NETWORK 25 EXPLORES HOW BEST-OF-BREED ORGANIZATIONS ACROSS THE GLOBE ARE DEALING WITH THESE CHALLENGES AND MORE. LOOK INSIDE AND SEE HOW SMALL THE WORLD REALLY IS.

Alan Alper

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25 NETS *that work*

by ANNE MCCRORY

WHAT IS THE NETWORK 25, ANYWAY? By now, you know it's our second annual "international compendium of network-savvy organizations."

By the time you read our issue, you'll know it's a list of 25 companies and other types of organizations with vision. With priorities. With technology strategies to empower widely dispersed employees the most cost-efficient, forward-looking way possible.

And you'll know something about the challenges they face across the varied terrain of our planet — not to mention the hodgepodge of technologies that make up and operate on their networks. You'll also find out how the Internet is — or isn't — changing business frontiers in various parts of the world, what skills are lacking and where, and what the experts foretell for the years to come.

As for The Network 25 organizations, they are a varied lot, as are the regions they represent: U.S. and Canada, Latin America, Europe, Asia and Australia, New Zealand and Southern Africa.

Their median 1996 information systems spending is $100 million. The range: from $3 million (the Stockholm Health Care Authority) to $3.75 billion (Samsung Electronics Co.).

The median networking budget? A sound $25 million. Amounts ranged from $1.3 million (Argentine Beverages Division) to $1.3 billion (Samsung). That was anywhere from 12% to 66% of the IS total.

What did they spend it on? We asked for a breakdown, and the group was fairly unified. More organizations — three in four — reported LANs among their top two priorities than any other technology. More than half named WANs. About a fifth noted network management, Internet/intranet and switching. All this is part of making the network the strategic asset it must be to move business to the 21st century (see ➤

THIS YEAR'S NETWORK 25 PRESENTS BEST-OF-BREED NETWORKERS AMID TODAY'S TECHNOLOGY CHALLENGES. HOW DO YOU COMPARE?

The Network 25

AN INTERNATIONAL COMPENDIUM OF NETWORK-SAVVY ORGANIZATIONS

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ARGONNE NATIONAL LABORATORY, U.S.

ATRAXIS AG, SWITZERLAND

BANCO BRADESCO SA, BRAZIL

BENETTON SPA, ITALY

BRITISH PETROLEUM, U.K.

CASINO WINDSOR, CANADA

CEMEX SA DE CV, MEXICO

COMPANHIA VALE DO RIO DOCE, BRAZIL

CSX CORP., U.S.

THE EQUITABLE COMPANIES, INC., U.S.

FLORIDA POWER AND LIGHT CO., U.S.

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HONGKONG AND SHANGHAI BANKING CORP., U.K.

MERITA BANK, FINLAND

NATIONAL UNIVERSITY OF SINGAPORE

PETROBRAS SA, BRAZIL

THE PROGRESSIVE CORP., U.S.

QANTAS AIRWAYS LTD., AUSTRALIA

SAMSUNG ELECTRONICS CO., KOREA

SKODA AUTOMOBILOVA A.S., CZECHOSLOVAKIA

SMITHKLINE BEECHAM PLC, U.K.

START INFORMATIK GMBH, GERMANY

STOCKHOLM HEALTH CARE AUTHORITY, SWEDEN

THE TIMES OF INDIA GROUP, INDIA

COMPUTERWORLD EDITORS selected The Network 25 from a pool of more than 125 organizations identified as network-savvy by our editors and researchers in the U.S. and at international IDG affiliates.

All organizations were surveyed on IS and networking expenditures, types of projects and priorities, staff and Internet-related issues.

Our selection criteria ruled out any organization spending less than 10% of its information technology budget on networking. We further examined how networking spending is aligned with strategic and tactical endeavors and is used to meet regional business challenges.

Finally, we sought a global distribution of candidates, so that no more than 25% were from the U.S. and Canada and the remainder were as equitably dispersed as possible among Europe, Asia, Latin America and Australia, New Zealand and Southern Africa.

This list is not a ranking or a definitive list of the "best" networked companies in the world; rather, it is a representative sampling of companies in various regions that are using network technologies to meet business objectives.

the "Net equals business" section, beginning on page 10).

Where the Web is concerned, all but two of The Network 25 have a Web site. In a tribute to their technical and business prowess, a somewhat astonishing 64% report that they are selling products on their site, and an even higher number — 68% — are using it to collaborate with business partners. Their comments regarding how the Internet provides business value were equally telling: facilitates information sharing and collaboration across geographic boundaries. Serves as data processing system infrastructure. Provides fast connection to all via email. Allows for extended service hours. Attracts younger and/or more customers.

Yet the Internet, global playing field that it is, has not made all these organizations international ones. More than half use it to communicate only with customers or businesses inside their own country; 40% use it to communicate with parties elsewhere; and only 8% report using it on both domestic and global fronts.

Why? As our Internet package (page 16) explains, one site doesn't fit all. Language and cultural barriers often stymie efforts intended to appeal to a broad populace. And the expense of connections, small local populations, low computer literacy and slight per-capita income still limit use across much of the globe, even as use overall creeps upward.

'NET IMPACT

Despite these considerations, the Internet has made an indelible impact on all The Network 25 organizations. All report some kind of system or network upgrades to handle the resulting internal traffic increase. Seven in 10 have upgraded bridges, routers and hubs. Two in three have upgraded servers. Half have migrated their entire network to TCP/IP. One in three has embraced Fast Ethernet and ATM in the backbone or undergone some other kind of upgrade.

Where access is concerned, half use their own hub or Web server; one in four uses a service provider exclusively; and one in four uses some combination of the two. Eighty percent termed high-speed access "expensive but worth it"; the others called it "affordable." Half use a combination of dial-up lines, ISDN, T1 and other means; one in four uses some other type of connection; one in 10 uses ISDN exclusively.

But the Internet is hardly their only concern. More longstanding networking technologies and applications, from WANs to E-mail, pose challenges worldwide (see "One Network Doesn't Fit All," page 32). And specific projects run the gamut. British Petroleum is upgrading 32,000 PCs in 100 countries to a common platform, ensuring intranet and Web access for all and developing "virtual teams" that communicate by videoconferencing. Qantas Airways is upgrading a network to incorporate an acquisition and develop a strategy. See these and other stories in our Profiles section, which starts on page 39.

The Network 25 is also about people: the median 45 networking professionals employed by the organizations on our list and the skills their organizations are desperately seeking. (These include networking and/or security skills at more than half the firms; system architects, network managers, router/switch specialists at many of the others.) A closer look at individual markets begins on page 26.

Finally, our regional analysis by experts starts on page 50. And don't miss the details on the Network 25 in the tables starting on page 54. As these organizations spend their technology dollars and work to embrace the Internet, so they, like us, strive to make sense of our ever-evolving networked world.

McCrory is managing editor of the Network 25.

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Net *equals* BUSINESS

by MICHAEL DORTCH

A fter spending gobs of time and money straining to build enterprise networks, many organizations across the globe are still struggling to get their digital conduits in sync with ever-shifting business goals.

Clearly, distributed computing — where the network is as critical as the systems — is very much alive and well.

It continues to thrive in traditional fat-client deployments and is taking hold in thin-client and intranet and extranet environments as well.

But users still have some distance to go in understanding all of the technical, cultural and organizational factors required to get enterprise networks to fully support their businesses. Doing so means knowing how to work in regions where infrastructure is poor, using private networks if necessary. It means knowing your priorities and, in the

process, perhaps delaying some deployments until the technology matures or its adoption becomes widespread. It means knowing how to forge alliances not just outside your company, but also within it.

Conflict continues on all fronts. Take one CIO from a worldwide construction concern who says he's trying to get strategic "buy-in" from his CEO, a senior executive who is "just emerging from the Stone Age" when it comes to strategic networking. Then ➤

there's the IS manager at a major provider of insurance and financial services whose concern isn't the technology, but the use of it. "[At our company,] we have an intranet that's really exploding. Everyone and their uncle wants to put stuff on it," says this manager, who like others spoke only on the condition he not be identified. "But I'm not sure how they're tying it to our business objectives."

An IS manager at a company in the aerospace industry takes that to another level. "There's a lack of awareness of the products in the marketplace and their capabilities" among senior corporate executives, he says, which results in many IS managers implementing solutions because "they're cool, not because they're good business." That, he says, underscores a lack of vision.

But there are plenty of organizations that do have leadership and do espouse a technology vision.

SOME LEADERS

The Hongkong and Shanghai Banking Corp. concluded in the early 1980s that without a global network tethered tightly to core business objectives, it would be unable to grow into a global bank from the six countries it then served. And that network (which became an X.25 packet-switched backbone and is now embracing frame relay) not only needed to serve clients, but also had to provide bank employees with information resources required to meet global banking imperatives.

"Once we have a beachhead somewhere, customers have to have access to everything we have — every system," notes Tim Cureton, the bank's head of group telecommunications. And from their desks, employees must be

Employees at Hongkong and Shanghai Banking Corp. must be able to access any server, no matter where it is. The evolving frame-relay network connects 3,000 offices in 72 countries and handles voice, SNA data and LAN traffic from millions of global accounts.

able to access any server — provided, of course, they have permission — wherever it is, he adds. This isn't just a desire, it's a mandate at the bank, whose network connects 3,000 offices in 72 countries and handles voice, SNA data and LAN traffic generated daily by its millions of global accounts. "You must use a group system for the same purpose, whether it is in Equator Bank in Africa, whether it is Marine Midland Bank in the States or Midland Bank in the U.K.," Cureton explains, citing various subsidiaries. (See related story, page 47.)

DHL Worldwide Express is also

wielding networking clout to achieve competitive business advantage. In a never-ending battle of technological one-upmanship with Federal Express Corp. and United Parcel Service, Inc., the package delivery company is reportedly looking to drive its DHLNET global network (a TCP/IP over X.25 and frame-relay backbone) to new heights, according to one company source. DHL wants to allow customers in 217 countries to initiate and track shipments to and from anywhere in the world via its World Wide Web site, even if elements of those shipments are handled by other carriers.

For example, a traveling DHL customer could track or reroute shipments initiated from his office before his trip began and even initiate new shipments designated to reach him at future locations on his itinerary. This new service will be targeted at occasional and low-volume shippers and is designed to complement DHL's existing services for high-volume users, the company source says. DHL did not return calls by press time.

The service is being built with C++ tools from Rational Software Corp. and will use Informix databases as back-end resources. To avoid the management overhead and expense of buying or building networking facilities in every country it serves, DHL plans to rely on leased Internet lines and Internet service providers (ISP). The company is also negotiating guaranteed levels of service with carriers and ISPs around the world, the source says.

NOT JUST THE NETWORK

Even at companies where networks are treated strategically, however, potential pitfalls abound. Perhaps surprisingly, observers say the complexity of distributed applications can be more of a problem than networking infrastructure. That may not be entirely obvious to all users.

"Many companies started [building] client/server applications and found out that it took longer than they thought and, many times, [went] way over their budget," says Hong Chen, president and CEO of AimQuest Corp., a Milpitas,
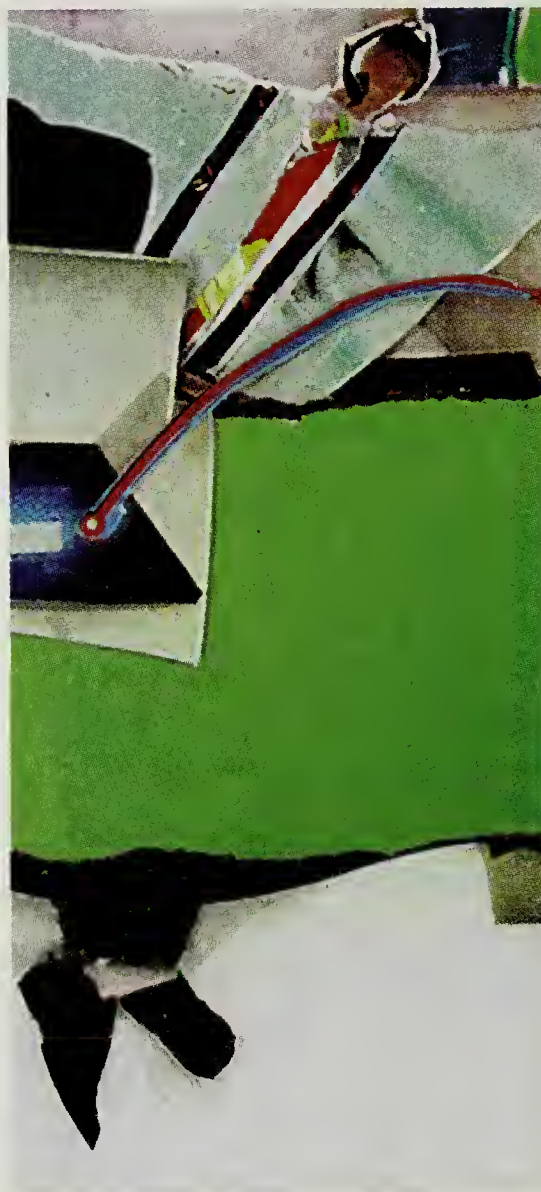
Calif., developer of a worldwide network of ISPs and telecommunications services. The fate of distributed computing has more to do with the difficulty of deploying client/server applications than with network bandwidth or infrastructure improvements, Chen notes.

Carrier and ISP improvements in networking bandwidth and infrastructure don't mean much to users who are grappling with this side of the coin. But, as some organizations begin to shift to TCP/IP-based networks and intranets or thin clients for their computing platform, some of these headaches begin to go away. Applications no longer need to be rewritten to accommodate every piece of communications software between the client and the server, so some applications are faster, easier and less expensive to build and deploy.

Of course, with new technologies also come new problems, from management of Java applets and ActiveX controls to finding ways to

address and overcome the same bandwidth issues facing carriers and ISPs.

At British Petroleum, for instance, more multimedia applications in use by widely dispersed employees is raising the bandwidth flag. The challenge: When employees in more than 100 countries can run video clips over the intranet, the source and destination of the bandwidth needed is unpredictable.

"Because every workstation has access to BP's global intranet, you don't know who will be accessing what from where," explains Andy Haywood telecom-munications team leader. "We don't want to provide bandwidth just in case there is demand, nor do we want

Users have some distance to go in understanding all of the technical, cultural and organizational factors required to get enterprise networks to fully support their businesses.

to provide it just too late." Some solutions: frame relay with scalable bandwidth, plus bandwidth top-up with ISDN, and use of network management to be more proactive in monitoring trends and assessing when new bandwidth will be required.

BEYOND THE INTERNET

Networking continues to contain numerous non-Internet challenges too, of course. Global enterprise networkers must be acutely aware of, and concerned about, the uneven state of networking infrastructure around the world. The only weapons they have are contracts with enforceable clauses guaranteeing minimum service levels and as many back-up facilities as they can afford, especially where local infrastructure is weakest.

Some enterprises depend more on private facilities and rely primarily on carrier services only where these have proved reliable.

And sometimes a company hands the job over to a third party to concentrate more on other initiatives. "We have eliminated our own private network for voice and data — except in some place such as Southeast Asia where we don't have the opportunity to use serviced networks," says BP's Haywood. "We want to simplify and rationalize the way we do things across the globe, and to do it in a common way." (See related story, page 40.)

The bottom line for global networks: Some assembly is still required — and certainly will be for some time to come.

Dortch is a San Francisco-based freelance writer and consultant. He can be reached at medortch@aol.com. Jon Skillings, former Hong Kong Bureau chief for the IDG News Service, and News Service London correspondent Ron Condon also contributed to this article.

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Global
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to the 'net

REGIONS ARE LOGGING ON TO THE WEB AS LOCAL CONDITIONS PERMIT

by ELISABETH HORWITT

N O QUESTION ABOUT IT: The World Wide Web is becoming a truly worldwide business communications medium. One has only to look at the numbers to see it.

In Brazil, the number of Web sites has exploded from 800 in January 1995 to 77,148 in January 1997, according to Cais Internet, a McLean, Va.-based Internet access provider.

In the U.K., 175 companies out of 500 surveyed by The TDS Group Ltd. in High Wycombe, Buckinghamshire, England, said they own Web sites.

In Malaysia, Internet users have more than quadrupled to more than 250,000 during the past two years, according to Nikkei BP Biztech, a Santa Clara, Calif., research and Web-based provider of information on Asian technology and business.

And in the U.S. and Canada, which will continue to be the epicenter of Internet/Web use, the number of households online will continue to grow through the year 2000, according to Jupiter Communications, a research firm in New York. Jupiter predicts an increase from 15.4 million households online at year-end 1996 to 38.2 million by 2000.

These growth figures, however, are only part of an extremely diverse picture. While Web commerce burgeons in prosperous nations such as Japan or the U.S., Third World countries are still struggling to get a basic network infrastructure to support the Web. And while business-to-business Web commerce has, for the most part, gone global, cultural, language and currency barriers coupled with low PC penetration has prevented consumer Web commerce from taking off in all but the top-tier countries.

Furthermore, although business Web sites are indeed proliferating in the world's economically developed countries, a large portion of those sites are extremely basic.

In the U.K., for example, the 175 company Web sites reported in TDS's survey "were mostly a statement of what a company does: a brochure, not a catalog," says Adrian Gregory, chief executive of TDS, which is in the process of setting up a Web-based trading environment.

In Brazil, too, companies use such pages principally to "get the company's name out" on the Web and, therefore, out to the world market, says Paul Shanahan, manager of user support for the American Chamber of Commerce, a Brazilian nonprofit business support organization. "Web commerce is just starting in Brazil."

Businesses all around the world are getting on the Web because they "don't want to be the only one that's not doing it," says Carlos Perry, ➤

illustration by JOHN BLECK

W hen it comes to World Wide Web use, "Latin America is a baby, but a baby with a thyroid condition," says Fernando Espuelas, chief executive officer of Starmedia Network, Inc. "There's an explosion today in Latin America of Internet use at all levels: consumer, business, government."

Espuelas should know: His company in Riverside, Conn., is counting on that explosion to power the market for its growing family of Web-based services, ranging from E-mail to financial information to Web hosting services.

Right now, the market for such services is minuscule, Espuelas admits. Only about 2 million PCs and between 3 million and 6 million users are currently connected to the Internet. That's 3.3% to 6.6% of a total Latin American population of 90 million, compared with about 40% PC penetration in the general U.S. population, Espuelas says.

Indeed, much of Latin America remains a hostile climate for fostering Web commerce. Real per-capita income in 1996 ranged from $1,022 in Ecuador to $5,632 in Argentina, according to The Yankee Group, a research firm based in Boston. The telecommunications infrastructure is still primitive, particularly in the interior

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> FERNANDO ESPUELAS, *CEO of Starmedia Network, Inc.*

a program manager at The Yankee Group in Boston. Once they have planted a flag in the Web turf, many businesses need further motivation — a profit motive or competitive pressure — to invest the time and money in fancy marketing graphics or an online product catalog.

FRIEND OR FOE?

A crucial ingredient for Web commerce growth within a given country is a business- and Web-friendly government.

Malaysia's rapid Internet growth, for example, can be largely attributed to government policies "aimed at raising PC literacy, liberalizing the telecom industry and encouraging use of IT at all levels," Nikkei BP Biztech says.

Business-friendly, tech-savvy administrations have helped fund network infrastructure modernizations; pushed through privatization of telecoms and encouraged competition in Internet services; helped set up pilot Web implementations in urban areas; funded technical education programs; and lowered trade barriers to foreign technology imports.

Conversely, a repressive or overly protective government can keep Web commerce from blossoming. In China and, to a certain extent, Germany, administrations are attempting to control and censor user access to Web sites deemed pornographic or subversive. Government bureaucracy and red tape in southern Europe has slowed network infrastructure modernization and other innovations.

THE U.S. HAD IT EASY

Consumer-based electronic commerce on the Web overseas is running into the same user concerns and entrenched shopping habits that have slowed its growth in the U.S.: security concerns, the absence of common legal definitions for enforcing electronic contracts, particularly across national boundaries, and shoppers' preference to see, touch and feel many products before buying.

On the positive side, the same attractions and potential benefits that launched Web commerce in the U.S. are also drawing foreign businesses to the medium — only more so, in many cases. Indeed, many Third World countries "see the Web and the electronic era as a great opportunity" for economic and commercial advancement, says Doug Kaplan, CEO at Nikkei BP Biztech.

First, however, many Third World countries must overcome obstacles that U.S. businesses and Web commerce proponents never had to contend with: low PC and even telephone penetration, low average education and income levels and, sometimes, censor-ship-minded governments. Then there's the issue of primitive network infrastructure and the cost to Web-enable it: the network access lines, PCs, Web software and Internet services.

And in Europe, for example, artificial protections to local telco monopolies and businesses have kept prices of high-tech products high. European users pay 30% more for PCs than their U.S. counterparts, so PC penetration is much lower: only 12.5% of the population on average, according to The Yankee Group. In contrast, about 40% of the general U.S. population owns PCs.

Furthermore, telecom companies everywhere in Europe but in the U.K. charge by the minute for Internet access, making Web surfing an expensive pursuit at best. As a result, potential Web consumers "will only visit a site if they are getting something out of it, instead of surfing for the hell of it," says John Fox, head of editorial services at ABB Group, a Zurich-based manufacturer. That can cut down drastically on the number of shoppers who get to a commercial Web site by means of banner ads, URLs and search engines such as Yahoo.

Then there are the local shopping preferences, anxieties and habits that can effectively frustrate the Web efforts of local merchants.

Start Media Plus, a Frankfurt-based travel service, for example, has not been surprised to see few online bookings on its Web site, according to

WILL CEMEX CUSTOMERS *use the Web to buy cement? The company's poring over the idea*

of the continent and outside urban areas. The percentage of residents who even have telephones ranges from single digits for countries such as Bolivia and Brazil to 18.3% for Costa Rica and 21.1% for Uruguay, according to The Yankee Group. Education levels are low outside the upper 20% income bracket.

What counts with Web entrepreneurs such as Espuelas, however, is that Latin America is aggressively pulling itself up by its bootstraps — economically, technologically and commercially — and turning itself into an open global market in which Web commerce will play an increasingly key role.

INDICATORS THERE
International Data Corp., a research firm in Framingham, Mass., recently projected that Latin America would see the fastest growth in PCs in the world through the year 2000 and server sales growth of 60%.

The number of Latin American computers connected to the Internet is growing at a rate of 300% or more per year, according to recent studies. "That's a lot of growth," Espuelas enthuses.

Business Web growth has followed user growth.

Of course, the growth varies from country to country. "The hottest Latin American markets for the 'net are, in order, Brazil and Mexico;

then Colombia, Chile and Argentina," says Carlos Perry, a program manager at Yankee Group's Latin American communications planning service.

Key growth drivers: Economies are improving, inflation is stabilizing and, perhaps most importantly, governments have become Web commerce proponents.

"The 'net is very much seen by governments in the region as a leveraging tool" for increasingly open and global Latin American markets, Espuelas says. "Governments have been fomenting competition through imports" by eliminating trade barriers and other artificial protections.

One result: "People can increasingly afford to buy a PC or pay a monthly Web access fee," Perry says.

Falling trade barriers are also forcing Latin American firms "to modernize their business practices and infrastructures in order to compete" with foreign companies for business both on their own turf and in the global marketplace, Espuelas says. And that definitely includes having a global market presence via the Web.

Take Cemex SA de C.V., a Mexican cement producer. "Right now, we are using the Web mostly for publishing information about the company and for recruiting services," says Ricardo Diaz, manager of evolution and technologies

development at the firm. That's changing fast, however.

IT is currently working on software that would allow Cemex and its suppliers to exchange electronic data interchange documents such as shipping and change orders via the 'net. "The Internet would be a nonexpensive, faster, more productive connection to maintain the relationship" with business partners, Diaz says.

Cemex is still evaluating the idea of selling cement over the Web. "The question is, will our customers want to use the Web" for such transactions, Diaz says. "A lot of them prefer to deal with us personally, and a lot do not use the Web for business processes."

The company maintains its own Web page. "We didn't outsource our site because we have a lot of plans for it, and we have our own IT company," Diaz says. "In the cement business, we're pretty leading edge."

Commerce is opening up not only between Latin America and the rest of the world but also across the continent. For instance, southern nations recently formed Merco Sur, a loose confederation dedicated to fostering cross-border trade. Andean countries in the north are "doing similar things," says Yankee Group's Perry.

Governments are working together on

the network infrastructures to support such trade, laying down fiber-optic terrestrial links across the mountains from Chile to Argentina and submarine cable connecting Brazil, Argentina and Uruguay along the coast.

National infrastructures are improving, too, aided by the privatization of government-owned telcos everywhere but Brazil and by investments in local telcos by U.S. carriers in countries such as Mexico.

Of course, "development rates differ among 18 countries," and in many areas, Web commerce in Latin America is still more potential than actual, Espuelas admits. In particular, it is coming very slowly to the poorer interior countries of jungles and mountains, which have not attracted foreign investment.

A common problem for Latin American businesses moving onto the Web is locating the expertise they need to exploit the Web, Espuelas says. For now, at least, "Latin America is fundamentally a technology consumer, not a producer."

"Demand for technical people outpaces supply," agrees Paul Shanahan, manager, user support, at the American Chamber of Commerce in Brazil (Amcham). "If you're a company whose business is not the Internet, it's rare for you to have internal 'net expertise." Instead, com-

panies are outsourcing their Web sites to organizations such as Amcham.

Still, more sophisticated applications are beginning to turn up, particularly among the "soft" information-intensive industries. Banks, for example, are beginning to use the Web to attract customers through direct marketing, as a cheaper alternative to mailing printed marketing material, Espuelas says.

Maksoud Plaza hotel is one Amcham member that takes reservations and receives credit-card information via the Web, Shanahan says.

And there's a huge market to tap. Unlike Europe, where Web sites have to be tailored to each country's languages and customs, Latin American users all speak one of two very similar languages, Spanish and Portuguese, he adds.

This all adds up to a potential market of some 90 million consumers reachable via the Web, Espuelas says.

Perhaps most importantly, "there is no shortage of interest here in the Web: People are fascinated," Perry says. "This is a part of the world where people can't get information, period. Latin Americans are now being told they can find anything they want on the Web; there's a level of fascination that will last a long time."

ELISABETH HORWITT

Thomas Rodel, director of new distribution systems at the Start Holding Gmbh division.

"Online bookings are not as popular in Germany as in the U.S. because most people don't use credit cards. In addition, they are very worried about security on the 'net," he says.

What will initially attract users to the site, Rodel says, is easy access to information about travel services and packages. "We expect people to look at our offers on the 'net, then go to travel agencies around the corner and do the actual booking."

One of the major detriments to Web retailing is the heterogeneity of languages, monetary systems and shopping habits across large regions of the world. Such disparities are preventing the Web from becoming a truly global marketing and sales medium, particularly in Asia and Europe.

Within individual countries and in relatively homogeneous continents, however, Web-based consumerism is definitely on the rise, industry analysts say. In the U.K., for example, electronic commerce currently provides just 3% of sales, but companies expect that number to grow to 20% by 2000, according to a recent report from KPMG Peat Marwick.

INCREASINGLY GLOBAL
Language and cultural barriers have been much less of a hindrance to business-to-business communications, particularly in manufacturing and high-tech areas that share an industry-specific culture and language. Furthermore, while retailers tend to restrict their marketing efforts to a single country or region, industrial manufacturers, business services and suppliers are increasingly putting a global spin on their buying and selling.

For such globally oriented companies, the Web's independence in time zone, distance and location makes it an ideal medium for commerce and communications, according to Russ Craig, a partner at Andersen Consulting.

Take ABB Group, manufacturer of industrial and building products such as power transmission equipment.

"We use the Web to steer users to the

YEAN FEE HO:
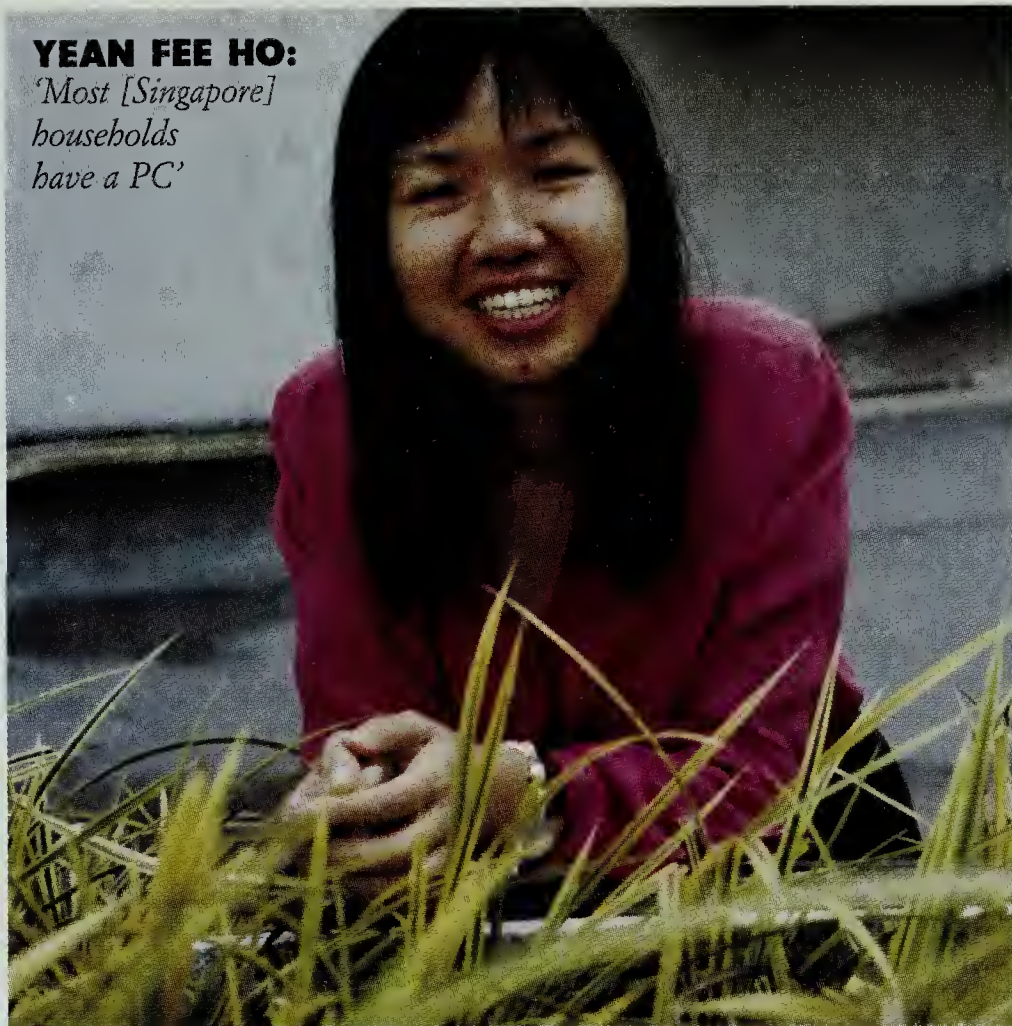*'Most [Singapore] households have a PC'*

PHOTO: PETER SERLING

ASIA

Beyond business enclaves, Web use is quick to take off – and has far to go

Asian factories build everything from sneakers to semiconductors. And their Western business partners want them on the Web. It lets them "shrink the time and cost out of the supply chain and update requirements," says Russ Craig, a partner at Andersen Consulting.

Supplier communication is only part of the Asian Internet picture. This is a land of contrasts — economic, political, cultural — and nowhere is that more apparent than on the Web.

Asia's 5 million to 10 million Internet users today are expected to grow tenfold to 100 million within five years, according to Nikkei BP Biztech, a Santa Clara, Calif.-based provider of business and high-tech news in Asia. But usage and business climates vary widely by country. Topping the list of Internet-friendly nations are Singapore, Hong Kong and Japan, in that order, says Jee-

van Kumaran, marketing manager of Internet business in Digital Equipment Corp.'s Asia-Pacific region. He calls these countries prosperous, educated, globally oriented business centers with advanced telecom infrastructures and "a rate of Web progress similar to the U.S."

Until recently, Japan lagged somewhat behind the others, largely because products and support literature from the U.S. had to be translated into Japan-

ese, creating a lag in the newest releases, Kumaran says. Also, Japanese PCs used a nonstandard BIOS, hindering the use of U.S.-based Web products, though that has now changed, Craig says.

But Japan is now off and running, and it's in the land of the sun that

General Electric Information Services chose Asia as one of the first areas outside the U.S. to launch its Trading Process Network, a Web-based supplier/manufacturing trading service. "We went to Asia because a lot of manufacturers in Asia want to get materials from a [Web-based] purchasing service," explains John Berry, a spokesman at the General Electric Co. subsidiary.

consumer shopping appears likely to succeed. Japan already has the distribution setup to deliver goods. And consumers, who give a lot of gifts and must fight crowds in many department stores, are likely to welcome the medium.

In contrast, in Singapore, "it is not the culture to purchase via mail order, much less via the Web, unless [the product] is not available in shops," says Yean Fee Ho, a manager in the IT division at Star+Globe Technologies Pte. Ltd., a vendor of multilingual information authoring and retrieval products. Star+Globe's Web site so far is just

informational.

Yet Singapore, with 105,000 Internet users — the third-largest number in Asia, Biztech says — is installing ISDN cables in every home, and "most households have a PC," Yean Fee notes. She says Internet access charges are still high, though Biztech reports increased competition and a recent price war among providers.

Cost is but one of many hurdles in other countries, where Web deployment efforts are up against poverty, lack of education and primitive infrastructure. But efforts to rise above those obstacles are under way.

In Malaysia, for example, the government recently initiated a major drive to raise PC literacy, liberalize the telecom industry and encourage IT at all levels, Biztech says. But this has created a demand that the two major Internet service providers (ISP) have not been able to fill.

A MIXED BLESSING.
Web commerce is limping along in Thailand because of huge fees levied by the Communications Authority of Thailand (CAT) on ISPs and a primitive telecom infrastructure, Biztech's Kaplan reports. ISPs pay CAT $40,000 per month for a 512K bit/sec. line — 60 times what ISPs pay in most other countries — and businesses must pay the authority nearly $5,000 a month to maintain a site, which accounts for the fact that only about 200

firms own sites, to date, a Biztech report notes.

Then there's the Chinese government, which despite well-publicized attempts to set up Internet filters is encouraging businesses and users to get on the Web.

Already, the efforts of different agencies and ministries have resulted in the deployment of not one but three national information backbones, according to Andersen Consulting.

"Where the government is infinitely involved in the infrastructure, you can get things done quickly," Kaplan says.

Indeed, many Asian countries have implemented modern network infrastructures faster than in the U.S., "where things are more decentralized and there are more legacy [network] systems" that must be modernized or replaced, he says.

Web business proponents and analysts, in fact, portray governmental influence as largely positive for that reason. "I have talked to progressives [in China] who are trying to pull [foreign] companies in for joint ventures and bring in technology, and they are very upbeat," Craig says. "They say the market there for PCs is bottomless. They didn't talk about government hard-liners or the chances of another Tianneman Square. They just said, 'Come on down!' "

ELISABETH HORWITT

Cultural, language barriers challenge the Continent

The global Web would be an ideal medium to reach a broader European market — if there were such a thing. As the European community remains culturally, linguistically and monetarily fragmented, so does European Web commerce — at least on the consumer side.

Business-to-business Web commerce is another story. Increasingly, global industries, largely undeterred by national boundaries, are using the Web for trade, marketing and information sharing, according to Chris Champion, an analyst at the European division of The Yankee Group, a Boston-based consulting firm.

Companies seeking a multinational Web presence still must balance the need to provide a single corporate image with the need to address the preferences, tastes and customs of different nationalities, analysts say. Take Kao Infosystems, which makes CD-ROMs and floppy disks for the software industry. The Kao Corp. subsidiary is putting up a European site to facilitate communications with its business partners. Jonathan Rawle, an IT manager, says his group is now figuring out how to design a site that "enhances the differences [between different countries],

Of the 17 million European Internet users, 7.5 million are business users or work for corporations, The Yankee Group says. Annual percentage growth rate of Web hosts is at least in the double digits across Europe, with countries such as Portugal, Belgium, Denmark, Spain and Italy seeing growth of more than 100%.

but not in a negative way that makes people scared of a bifurcated company."

That's a challenge European Web retailers have been confronting for some ⟩

right [product] area where they can get information appropriate to their needs," says Fox, head of editorial services.

With tens of thousands of offerings managed by 37 geographically dispersed business groups, "there is no way we can maintain an up-to-date, centralized product catalog at our group site," Fox says.

Instead, Fox's group provides a "general-level" product index at the central Web site, where customers can learn about the company and zero in on the "transformer or particular type of switch gear or relay" they want, he says. Then they can surf via URL link to the business division responsible for that type of product. And it doesn't matter in the least where in the world the user or the business group is located.

ABB is far from alone. Companies worldwide are getting on the Web to collaborate with partners on marketing campaigns and product designs; to notify customers of price changes, new features and products; to offer special deals; to track shipments and development cycles; and to locate suppliers and put out requests for proposals.

That last electronic-commerce application is among the fastest growing on the Web, nurtured by a growing number of Web-based supplier directories and other trading services.

The TDS Group and BT, for example, are jointly piloting a Web-based trading platform that includes an online product registry and supplier directory, based on software from Trade'ex Electronic Commerce Systems, Inc. in Tampa, Fla.

"I'd say with this initiative, the U.K. will become a leader of electronic commerce on the Web over 12 months," TDS's Gregory says. The company also hopes to link its U.K. service to Trade'ex-based services in other regions, creating a truly global Web-based trading system, he adds.

The first step, of course, is signing up a critical mass of business customers. Fortunately, Gregory says, "BT has a lot of marketing muscle and the resources to change the way people do business, which is what's needed to get EC really flying."

Horwitt is a freelance writer in Newton, Mass.

time. They must tailor their Web sites to match the language, culture and monetary units of a country or risk losing their audience, says Russ Craig, a partner at Andersen Consulting. "I keep having conversations with [European] clients on whether they can get away with English on the Web. And the conclusion is, you have to have the native language," he explains.

A couple years ago, Andersen Consulting studied electronic commerce and travel services and collected travel brochures. It discovered that while African and German brochures stressed adventure and danger, U.S. brochures emphasized nature and family. In short, they appealed to consumers in different ways.

Thomas Rodel, director of new distribution systems at Start Media Plus, can vouch for that. The travel services subsidiary of Frankfurt-based Start Holding Gmbh has been "focusing our Internet services on the German market right now because we think

that any 'net-based offer should be designed for local users, and not only the language but the local flavor," he says.

Yet localizing services, as well as the low number of European households with 'net access (just 3.5% this year, The Yankee Group says), may deprive businesses of the numbers needed to succeed. "You need a critical mass [of potential customers] to be selling into any market," Yankee Group's Champion says.

Further, a European distribution network is a prerequisite for European marketing and sales via the Web, and few retailers have that, Champion says. An exception is Italian clothing company Benetton, "which has a well-developed distribution network in 90% to 99% of all European countries," he adds.

More typical is TV-Shop, a company started by Swedish conglomerate Kinnevik, which does mail-order TV shopping and recently started a Web-based online shopping net-

work. "They advertise across Europe but sell only in a few countries because they have to have local distribution channels," Champion says. "It's prohibitively expensive to mail many of the products sold, like the Gut Buster, across so many domestic boundaries."

It's expensive for consumers to shop, too. Most telecoms in Europe charge by the minute for 'net access, so consumers "will only visit a site if they are getting something out of it, instead of surfing for the hell of it," notes John Fox, head of editorial services at ABB Group in Zurich.

Technology innovation in Europe can also be stymied by entrenched authority, Craig says. Government bureaucracy is the primary reason Italy has one of Europe's most primitive infrastructures, says Jupiter Communications, a research firm in New York. Government-supported telecom monopolies have kept network service prices up; high import tariffs have kept PCs and Web software prices high. Then there is the "not made here" syn-

JOHN FOX: *Consumers 'will only visit a site if they are getting something out of it'*

drome: proprietary systems of local telcos and vendors perpetuating themselves at the Web's expense. The classic example is French users' refusal to abandon Minitel, France Telecom's text-based online service, for the carrier's Web-based equivalent, Wanado.

Yet some countries have a positive prognosis. A recent study by Forrester Research, Inc. in Cambridge, Mass., rated Germany, the U.K., the Netherlands, Belgium/Luxemborg, Austria, Switzerland and Scandinavia a 4 or 5 on a scale of 1 to 5 in terms of technology penetration and political climate — two of the study's three key indicators. While many countries rated a 2 on the third indicator — size of market — their growing trade with other countries gives them a favorable outlook, Forrester says.

Eastern Europe, meanwhile, is "behind the West in terms of economic development" but has potential for Web commerce, Jupiter says.

ELISABETH HORWITT

A market with promise

In a recent address to a forum on electronic business, Alan Stockdale bemoaned the fact that while "many companies are using electronic marketing techniques, have a home page or are using other network IT applications . . . in Australia, generally, the current pace of activity in electronic commerce is too slow." Not only the U.S., "but even countries like Sweden and Ireland are using electronic commerce more extensively and more creatively then we are," says Stockdale, Victoria's treasurer and minister for multimedia.

But Stockdale's comments are indicative less of Australia's current rate of Web assimilation than of a prevailing attitude toward high tech in Australia: a determination to be firstest with the mostest, worldwide.

"We're known for our early adoption of technology," says Jon Mysel, principal consultant and general manager at The Hiser Group, a Sidney firm that designs Web user interfaces and does Web usability analysis for clients. For example, "Australia has the highest penetration of VCRs and mobile phones in the world."
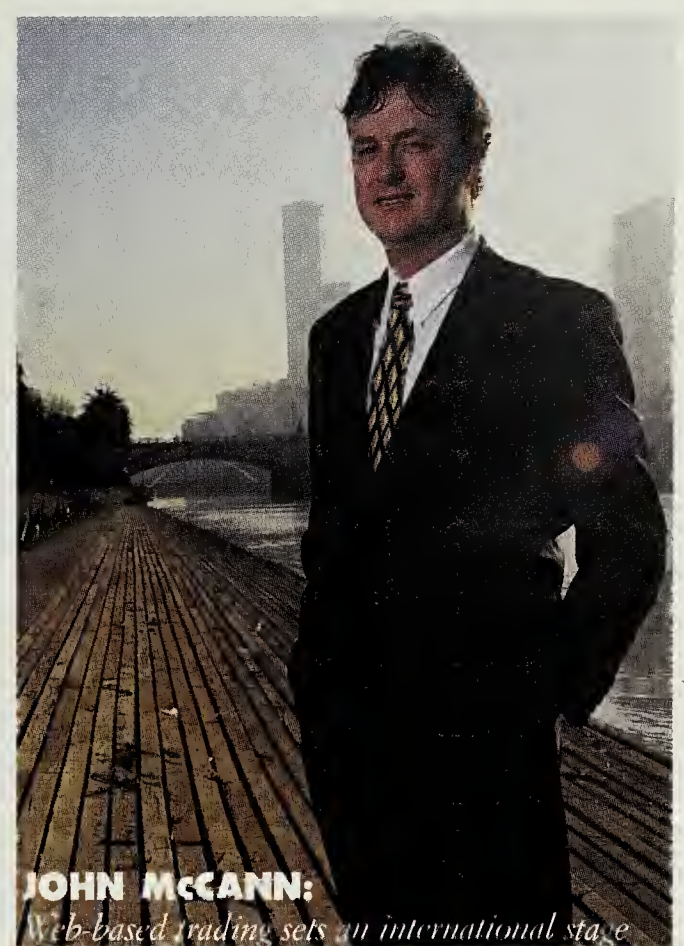
Far more significant to Web commerce proponents, 4 million Australians in 2 million homes use computers, according to the Australian Bureau of Statistics. That's at least 20% of a total population of between 18 million and 20 million. And 55% of all households have PCs with CD-ROMs and modems, according to Mysel.

It's no surprise, then, that Australia has one of the highest per capita Internet usage rates in the world: 20%, up from 12% a year ago, says the Centre for Electronic Commerce at Monash University in Victoria.

The high Internet penetration rate helps make up for what Forrester Research in a recent report defined as Australia's major Web commerce weakness: a small regional population that translates into a limited market pool.

Indeed, Australia's user base makes up in quality what it lacks in quantity: English as a first language, generally high levels of education and disposable income and a well-established passion for consumer electronics.

A rapidly growing roster of Australian businesses are following those tasty consumer demographics right onto the Web.

Major customers of The Hiser Group in consumer areas such as banking, manufacturing and insurance, for example, "see the Web as a place to strategically position themselves and sell real products and services — not just market them," Mysel says.

And in the retailing sector, a growing number of sites offer users Web-based shopping all the way through to purchase, Mysel says.

One such site was launched last October by David Jones, one of Australia's oldest clothing and household goods stores. Co-developed with British advertising firm Saatchi & Saatchi, Australian Web developer The Harrow Group and Microsoft Consulting Services, the site incorporates Microsoft Corp.'s Windows NT 4.0, Mer-

chant Server, Back Office and an SQL Server back end. Shoppers can browse through different sections of the online catalog or search the clothing, toys, housewares, food and drink or music departments by person, price range and keyword.

The company instituted its site "in an effort to provide our customers, especially those geographically isolated from one of our stores, with another way of viewing and purchasing our products," says Damian Eales, national home shopping manager at David Jones. "In particular, we did some advertising of our site in the print media in the U.K. and Asia so that relatives and friends of people living in Australia could use this service to purchase Christmas gifts over the Web" instead of paying to ➤

JOHN McCANN: *Web-based trading sets an international stage*

ship such products overseas.

Eales' major complaint with the Australian Web infrastructure is the lack of readily available, affordable bandwidth. "We can't send [users] the graphics we'd like" because response time would be unacceptable with current modem rates, he explains.

"The cost of telecommunications is inhibitive," with some services costing as much as 10 times the same offerings in the U.S., Stockdale agrees.

But improvements are on the way. Recently privatized telco Telstra Corp. and its young competitor, Optus Communications, are racing to lay fiber-optic cable to support high-bandwidth multimedia Web services right to the home.

Two factors are speeding this deployment. First, CATV is new in Australia, so there is no legacy copper wiring to rip out or depreciate, Mysel says. Second, 30% of the population is centralized in large urban areas, enabling carriers to reach a large user base with relatively small outlay.

On the business-to-business front, government agencies and business consortia such as Tradegate and the Australian Chamber of Manufacturers (ACM) are promoting the Web as a keystone of a regional effort to promote trade in the Pacific Rim. For example, they have "established an online site for marketing Australia's agricultural products throughout Asia working in partnership with agricultural and food industries in Victoria," Stockdale said in his recent forum talk. And the Melbourne Flower Market uses a Web-based auction system to sell to the Japanese.

"The Australian federal government has sponsored several [electronic commerce] awareness-raising initiatives," such as a pilot trading platform and product directory implemented with ACM, says John McCann, national business services manager at ACM in Melbourne.

"EC applications such as the Web-based trading environment provide a means of marketing and distributing Australian products efficiently both domestically and, more importantly, internationally," McCann says. In particular, it lets small to medium-size companies that "traditionally take two years to establish a product successfully in an overseas market" to establish a presence in two months, he adds.

One incentive to business Web deployment is the government's announcement that it will do all procurement "by electronic interface by the end of 1997," McCann says. "That's a $30 billion [Australian] market — quite a carrot. And the stick is, if you don't adopt the required technology, your competitor most likely will and, at worst, lock you out of the market."

ELISABETH HORWITT

In all reports that analyze worldwide Web use, Southern Africa winds up at the bottom of the heap, if mentioned.

"The problem throughout Africa is that marketplaces are generally underdeveloped, so they have a limited attraction for major [foreign technology companies] to set up presences there," says Michael Portlock, an independent telecom consultant who works there. Further, "in many parts of black Africa, telecom systems are so bad that the likelihood of setting up any type of Internet capability is very low."

Indeed, a 1996 report by Jupiter Communications in New York said the number of Internet users in most African nations is only in the hundreds.

The big exception is

SOUTHERN AFRICA

Slow start but steady growth

South Africa, which already has about 500,000 Internet users and is expected to reach the 1 million mark by year's end.

By the turn of the century, the South African Internet site development and advertising market could be worth $215 million (U.S.), with online transactions exceeding the $425,000 mark, according to IDG South Africa.

"South Africa is the wealthiest of African countries, with the white minority possessing the overwhelming majority of capital," Portlock says. "That English is widely spoken is a factor in online usage."

South Africa also has a decent telecom infrastructure, at least in its major cities, he says. And major computer suppliers, which operated through agents in the apartheid era, are beginning to have direct involvement in the country.

Still, Web commerce is just taking off in South Africa. For example, Absa Bank recently set up a pilot program of the SET security standard for Web-based credit-card transactions. The pilot will involve merchants, Visa and MasterCard, and 50 credit-card users.

Absa has also set up Destiny Electronic Commerce, a joint venture with Nasionale Pers said to be the country's first secure "virtual mall."

The other three major South African banks have all recently introduced Internet-based services, including access to account balances and statements, account payments, interaccount transfers and checkbook requests and secure, online banking transactions.

While Web commerce remains a dim prospect for most of the rest of the region, there are some hopeful signs. "A lot of countries are developing cellular networks and their own satellite systems," Portlock says.

Tanzania is one of the areas outside South Africa where the Internet seems to be taking hold. "There are quite a number of companies/institutions providing Internet services there," says Hassan Ali, a Tanzanian expatriate now living in Canada. Heartbeat Online Tanzania, for example, started last December to offer full Internet services through a VSAT link to the Internet through France. The company charges a $200 access fee plus $50 a month (U.S.), which is fairly typical of rates there.

Web commerce is also taking off in Tanzania. "They are getting to the stage where corporations are developing big Web sites," Portlock says.

ELISABETH HORWITT

Universal skills

WHETHER IT'S WANS IN INDIA OR NETWORK ARCHITECTS IN AUSTRALIA, THE CONSTANT IS DEMAND EXCEEDS SUPPLY

by LESLIE GOFF If there's one collective shout heard round the world as companies develop networking projects, it's this: Help!

Skilled professionals are in short supply.

"Many of the skills in demand here in North America are echoed throughout other First World countries, with maybe a 12-month lag," says Stan Lepeak, vice president of the Meta Group's Advanced Management Strategies service in Stamford, Conn. Microcosms of the supply-and-demand gap North American companies face are emerging across the board.

"Companies worldwide really need to look at their recruiting and retention strategies — from day care, to beers in the fridge to telecommuting and flextime — and they need to put together a whole package of tactics to locate these people and keep them on board," Lepeak says.

Here's a look at what companies in each region are, in fact, doing to find — and keep — valuable network staff members.

Goff is a freelance writer in New York.

australia Seeking global network architects

Qantas Airways Ltd. supports a global network that connects its Sydney, Australia, headquarters with its offices on every continent. The airline is in the midst of reevaluating its technology infrastructure and how it deploys new systems across the board. But Des Kennedy, general manager for information technology infrastructure, notes that with a centralized staff of only 25 supporting its LANs and 12 working on the WAN, outsourcing the project is under serious review.

CW: Which networking skills are in high demand in Australia, and how difficult are they to come by?

KENNEDY: We need network design skills and, alongside those, skills in particular technologies like ATM switching. Also Novell and NT LAN skills are in

GAP

demand, depending on where companies are in terms of imple-mentation. We need Novell 4.1 because we use it as our main network operating system, but we use NT as our server operating system.

We're trying to hire people who have rolled LANs out in a complex environment like Qantas'. A lot of candidates claim to have the skills, but they don't have the depth of knowledge needed to take on a project here. We can get the skills locally, but because of the high demand, they can ask for really high salaries.

But when we were looking for a global network architect, we couldn't find anyone in Australia.

CW: What's driving these needs at Qantas?

KENNEDY: Our needs are exaggerated because we are reviewing all of our technologies and architectures at the same time. So while we're doing ATM and frame relay globally, we're also doing NetWare 4.1 locally. We're also reviewing our call center technology.

Qantas has suffered from a lack of investment in reskilling and in our infrastructure, but now we're committed to catching up. The IT focus wasn't high before, but management is well aware of the need to refocus, and we're thinking through how we can work that out. There's no question that as we move forward, we will have to have significant in-house training. Even if we choose (outsourcing), we will need additional skills to what we have now.

CW: What were you looking for in a global network architect, and how did you find the one you hired?

KENNEDY: We needed someone who knew the details of the airline industry, because we have unique protocols and relationships and they had to understand that environment very quickly. We have a lot of variation, business-critical applications, time-sensitive processes and communication protocols that are specific to the airline industry.

We found him through personal contact. [Our CIO] had worked for Air Canada, where he was working. It's very expensive, because we have to pay all his travel and personal expenses, but when we have the new global network in place, we'll recover those costs very quickly.

illustration by SCOTT MENCHIN

Leadership[3]

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`europe` In Europe, e-commerce fuels demand

The growth of electronic commerce is swelling the networking supply-and-demand gap in Europe as companies transition their Electronic Data Interchange applications from private value-added networks to the Internet and look to leverage their Web sites for online transactions. Sven Hammar, president of Media Communications, a systems integration and consulting firm in Sweden, has worked on networking projects with IS organizations across the continent, including the Network 25's Stockholm Health Care Authority.

CW: What's driving the demand for networking professionals in Europe?

HAMMAR: The increased amount of Internet commerce here is placing an emphasis on people with both communications and security backgrounds. So, first, companies want Internet solutions and, after that, security solutions. They're realigning all their systems, including mainframe systems, toward the 'net, with more and more live applications on the 'net, like EDI and customer reservation systems — not just Web sites.

Web designers got a lot of attention for a while, but now we're seeing a shift from demand for Web gurus to more old-fashioned database and communication professionals who can provide applications migration and put real systems up on the 'net. Putting EDI systems on public networks is a very big thing here right now, for example.

The American export restrictions on security products has created a big gap in the products available to European companies, and they are using lots of consulting to develop their own security and encryption solutions.

CW: What specific networking skills and experience are European companies looking for?

HAMMAR: In terms of security, they're looking for people who have created virtual private networks, who have created secure environments for online transactions — including digital signatures — and who have practical experience in the use of encryption algorithms and the upcoming SET (Secure Electronic Transaction) standard. If someone has done one banking application, they can migrate their mind to a new one, and that market is expected to explode in the next year.

EDI experience is also in very high demand, especially people who have experience establishing EDI over the Internet, because the economic benefits of doing that are so high.

Traditionally, both Unix and NT have been in demand for LAN support, but now NT is gaining the advantage. When I have two candidates and one has a Unix background, and one has NT, I take the NT person because he has more time ahead of him. And if someone has had experience at some stage as an applications developer or has done database work, that's great, especially SQL Server, Oracle and Sybase.

CW: How are companies finding the skills they need?

HAMMAR: The demand is very high, and there are not enough people to do the job. So if companies already have the qualified personnel, they are usually developing bonus systems or stock bonuses to gain their loyalty. Otherwise, the salaries would just start getting crazier. I think there's been a 15% to 20% increase in these salaries over the last two years here in Sweden, and Swedish companies don't pay as well compared to those in other European countries. The average salary for an IS professional here would be equal to about $50,000 or $60,000 in U.S. dollars.

In Sweden, unfortunately, most people take jobs outside the country because salaries are higher and the climate is warmer. The big companies like Erikson and Volvo have to use large groups of consultants because they can't get full-timers.

`latin america` Looking for Internet pros

StarMedia Network, Inc. is the developer of a World Wide Web-based online entertainment service for the Latin American market (www.starmedia.com). Now expanding its service via several partnerships with television networks, the U.S.-based company is looking to deploy local operations and support in the top five Latin American markets: Mexico, Argentina, Brazil, Chile and Colombia. StarMedia is in talks with two potential outsourcing partners that would help manage the expanded infrastructure, but it also intends to hire its own local talent in each country.

Fernando Espuelas, chief executive officer, and Jonathan Hirschman, vice president of operations, are devising the company's hiring strategy.

CW: What networking skills do you envision needing in your local Latin American operations?

HIRSCHMAN: They'll fall pretty straightforwardly into server maintenance and infrastructure issues. We're platform agnostic, so we will likely require both NT and Unix skills. But we'll be focused on infrastructure needs as opposed to the applications expertise that we've

needed here, so it will come down to a basic hardware/software split. We'll also be looking for database administrators, but at this point, the exact positions are still being formulated, based on the future technology decisions we have to make.

ESPUELAS: Our needs will be fairly consistent across each country, but what will drive them will depend on the strengths of the partner we choose. We want an intelligent entity locally in each country to manage the process.

CW: How difficult do you anticipate it will be to find networking professionals?

ESPUELAS: Supply and demand is a concern. The IT infrastructure sector is booming throughout Latin America, so the types of people we'll be seeking are highly attractive to other companies in the telecom-munications and networking business. We think we have an advantage because, due to the nature of our business, we provide a dynamic place to work without the encum-brances of a big corporation. Part of our strategy is to give every employee a stock option plan. We're able to give someone who's ambitious the chance to have equity in the company and to have an upside with our success.

CW: What recruiting strategies will you use?

ESPUELAS: We have an extensive network of telecommunications companies and Internet service providers that we work with, so we will use the referral system. We'll definitely seek to fill all the positions locally. We think there's a lot of value in having local players who understand the culture. In addition to their tech-nical capabilities, we'll be looking at their ability to deal effectively with different Latin American businesses, because the business culture varies from country to country.

CW: Besides stock options, what else do you expect to offer in terms of salaries and benefits, and how will that influence your hiring plans?

ESPUELAS: In every country besides Brazil, salaries are 25% to 40% lower than in North America, so that's another reason why it's smart for us to deploy people locally. In Brazil, because of the way the currency is tied to the dollar, salaries are 100% to 120% of those in the U.S. market. So while that's important for us, we will try to hire fewer people there. Our largest contingents will probably be in Mexico and Chile, which are cheaper markets but have lots of talent.

india A good WAN (professional) is hard to find

When The Times of India, *the country's largest newspaper, rolled out one of the first wide-area networks in India in 1991, experienced WAN professionals were unheard of. So A. Peter, the publisher's general manager for information technology, hired five fresh college grads who had studied engineering and communications, and they immersed themselves in a baptism by fire.*

Today, the WAN encompasses The Times' *Bombay headquarters, the IS organization in New Dehli and remote offices in 50 locations nationwide. Each office runs on a Unix-based LAN that supports Windows 95 clients, with connectivity via TCP/IP over leased lines. Next year, Peter plans to add two positions to his networking staff to support a network expansion.*

CW: How has the networking landscape in India changed since you first implemented your WAN?

PETER: Most organizations now have Novell or other types of LANs. In the last year to 18 months, a lot of them have begun wide-area networking, so you can find trained people in the market now. But they're hard to get because there's more competition locally. And a lot of the best ones are migrating to the U.S. and some go to Europe.

CW: What retention strategies have you adopted?

PETER: Most are better paid than the market rate. In U.S. dollars, they make about $2,500 a month — salary levels overall are not that high here. Also, they are given flexible working hours, and they have a lot of autonomy. For example, most of our office people work 10 to 5, but we don't insist that the technical staff is in at 10 — they can come in at 11 or 12, and then work late into the evening. And since the network must be looked at on a 24-hour basis, and the entire business depends on the net being up, some of our senior tech staff have access from their homes. So if there's a problem on Sundays or holidays, they can probably fix it from home.

CW: What's the profile for your ideal networking candidates, and how do you find them?

PETER: At the junior level, we look at graduates in engineering who specialize in communications and maybe have one to two years of experience — but that much experience is very difficult to find. So we do campus recruiting. For senior-level positions, we do advertising. Sometimes we don't need to advertise. We are frequently a reference point when it comes to networks and network-based applications. So some good people who have not gone abroad will come to us and inquire.

One network DOESN'T fit all

The Internet may get

all the attention,

but companies have other

conduits to deal with, too

DIFFERENT NETWORKS have different functions but one purpose: getting information where it needs to go. Here, a look at four pieces of the network pie, and the challenges users face around the world.

A twisted pair

by BOB WALLACE

WHEN WORKING OVERSEAS, RELATIONSHIPS, RATHER THAN TECHNOLOGIES, DETERMINE WHETHER YOUR PROJECT SUCCEEDS

Users looking to build LANs outside the U.S. will find that technology takes a backseat to selecting value-added resellers (VAR) and learning the socioeconomic lay of the land.

Researchers say that there really isn't a shortage of switching and routing equipment around the globe, but that more advanced countries — England, France, Germany and Japan — make wider use of the latest technologies than other nations. The technologies available largely mirror those available in the U.S. Switched Ethernet, Fast Ethernet and Asynchronous Transfer Mode have been deployed in many places and continue to pick up speed.

On the WAN side, countries with less developed infrastructures can have an advantage in that they can often leapfrog an evolutionary network stage and more quickly deploy more advanced technologies, if they have the money.

Interoperability is not a grave concern, as most large multinational or global firms have standardized on one vendor's equipment. In fact, Mark Maxwell found that picking the right reseller and cabling management firm was a bigger undertaking than selecting and buying internetworking equipment.

"It can be the difference between a successful project and something that makes you very unhappy," warns Maxwell, global systems manager at Fuji Capital Markets Corp., a trading firm in New York. "You have to do a lot of research up front to make sure you and they see eye to eye. You can design the most beautiful network, but if the people you pick to support it aren't up to par, they can destroy it."

Maxwell succeeded, ➤

illustrations by JAMES F. KRAUS

and redid the trading floor in London last year and recently finished one in Hong Kong. The facilities use a 100M bit/sec. Fast Ethernet backbone and switched Ethernet toward the desktop.

Air Products and Chemicals, Inc. took an alternative path and decided to work with its supplier — 3Com Corp. — and VARs in the 90 countries in which the Allentown, Pa., firm operates. Its global networks support merchandise tracking and back-office applications.

"We build relationships through 3Com with its VARs, and they tend to work out well because the VAR typically has a very good idea what needs to be done," says Virgil Palmer, director of telecommunications and networks at Air Products, a worldwide supplier of

industrial gases, specialty chemicals and associated equipment and services. "We used VARs to handle a turnkey installation in Singapore, for example." He says the VAR handled just about everything, from LAN setup to testing and certification of the equipment and cable plant in the Singapore office.

Learning about the socioeconomic ways of the regions in which you wish to build is also a must, according to Chuck Rush, global network architect at McDonald's Corp. in Oakbrook Terrace, Ill.

"We found doing business in Latin America a real pleasure, because a large group of countries share the same heritage and business outlook. What that means is they help each other on

big business projects," Rush says. The fast-food giant operates in more than 100 countries, including Russia and those in Eastern Europe.

Each store has a shared Ethernet LAN for its roughly 50 employees. (Rush can't justify higher speed schemes unless the number of employees climbs significantly.) The stores are linked primarily via a worldwide frame-relay network, which lets them communicate to McDonald's headquarters in Oakbrook Terrace.

The Home Depot, Inc. plans to open a store in Chile soon and was extremely pleased with the reception it received from the country.

"They welcomed us with open arms and are working on ways to make the

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[MESSAGING]

Integration is

A SINGLE NETWORK AND COORDINATED SOFTWARE IS A GLOBAL GOAL

by SURUCHI MOHAN

Robert Brown is looking seriously at E-mail integration. Currently, he sends 90% of his electronic mail as ASCII text on Novell, Inc.'s Message Handling Service with Da Vinci Systems Corp.'s email. All other data traffic uses a proprietary IPX network. But this scenario has to change, says Brown, assistant vice president of information services at Queens County Savings Bank in Flushing, N.Y.

As users ask for more capabilities on the desktop — such as sending complex E-mail attachments — and administrators cry for fewer networking headaches, integration of messaging with the networking infrastructure and of E-mail and desktop applications looks ever more appealing. That's what Brown, who recently completed a frame-relay network to bump up bandwidth and relieve congestion, says

he will do next.

And while regional differences do exist where messaging is concerned, many of those distinctions relate not only to an organization's E-mail past but to its technological future. Integration often starts at the network level, where disparate networks are integrated into one. It then moves into the client and server environments, with software suites that often include E-mail capabilities.

When Dennis Murray contemplates extending global E-mail capabilities throughout his company's 70 offices worldwide, he has to remember that network capacity and equipment is far more limited and less sophisticated outside the U.S. "We have been leveraging the messaging layer in foreign countries. It hasn't been easy," says Murray, head of cooperative technologies for clinical development

project a success," says Bradley Albers, senior manager of information services at Home Depot in Atlanta. "You need all the help you can get when setting up shop outside the U.S."

However, that phenomenon doesn't apply to all regions, McDonald's Rush adds. "Working in Eastern Europe and Russia is a challenge at best, because there really isn't a common mindset among countries for handling international networking," Rush says. "And some countries are much better off financially than others. You'd think China would be one of the others, but their market is strong, and they're very industry-minded."

Skip MacAskill, a senior analyst at Gartner Group, Inc., a global research and consulting firm in Stamford, Conn., says Australia is very advanced. "But the emphasis in networking in Australia is the WAN, not the LAN. That's because the continent has most of its population located in far-flung cities and has to use undersea cables to reach every other country," MacAskill adds. "It's something global networkers need to be aware of."

On the intranet front, the U.S. holds a commanding lead, largely because bandwidth is far more plentiful and affordable and there's no shortage of service and support staff for these networks. But on the downside, U.S. firms looking to extend their intranets beyond the U.S. can expect slow going.

For the future, users can expect the international LAN infrastructure industry to improve. That's because the top internetworking vendors count on international sales for a larger part of their revenues and are investing more in building up their VAR networks, says Tam Dell'Oro, founder of The Dell'Oro Group, a Portola Valley, Calif., research and consulting firm.

"International sales account for almost half the revenues of Cisco [Systems, Inc.], 3Com and Bay Networks [Inc.]," Dell'Oro says. "Obviously, this is a huge growth area, which means vendors will invest heavily in their international operations."

Wallace is a Computerworld senior editor, internetworking.

the name of the game

and regulatory affairs at Novartis Pharmaceuticals Corp. in East Hanover, N.J. He notes that he's not yet ready to consider adding audio and video capabilities for this very reason.

Like many network managers, Gilles Simon, electronic communications manager at SGS Thomson Microelectronics in Saint Genis, France, is seeking E-mail stability. Between 1993 and 1996, Simon's mission was to merge his company's three legacy E-mail systems into one corporate backbone. What followed was a TCP/IP network, first on X.25 and now on frame relay and Hewlett-Packard Co.'s OpenMail with a Lotus Development Corp. CC:Mail client. Integration at the desktop is looming large on the horizon as well.

In addition to the ability to send complex documents as attachments, "people want group calendaring/scheduling and task management," Simon says.

Also pushing the integration trend

are vendors, ever bringing new technology to market in an attempt to create a need for their offerings.

Corning, Inc. was 100% Digital Equipment Corp. All-In-1 until about 1995, when small islands of Microsoft Corp.'s Mail sprouted up, and local departmental servers came into being to support them, says Greg Di Iorio, manager of Internet messaging technologies in Corning, N.Y. Lotus Notes also mushroomed in small pockets, and in 1995-96, Corning was going full steam ahead with two parallel networks. That's when market pressures to go with groupware began to be felt.

"We saw the convergence of groupware. In 1996, we said, 'we have to pick a product; we can't build everything in stovepipes,'" Di Iorio says. Once E-mail standards take hold, traffic on the network increases, as users attach files from spreadsheets to audio and video clips.

But E-mail isn't an essential part of

business everywhere. At The Hongkong and Shanghai Banking Corp., "if your E-mail fails, the business probably is not going to fail," says Tim Cureton, senior manager and head of group telecommunications in Hong Kong.

Still, E-mail has become a part of doing business at many companies. At Telia Data AB in Stockholm, E-mail "has become an important part of information distribution within companies," notes Kenneth Mattsson, technical manager for messaging products.

And wherever that's the case, says Tim Sloane, an analyst with Aberdeen Group in Boston, companies should look at "list servers [and] report generators that use that infrastructure to make sure it is leveraged."

Mohan is a freelance writer in Los Altos, Calif. Juha Saarinen, a freelance writer in Auckland, New Zealand, contributed to this story.

Devising a WAN plan

by MICHAEL DORTCH

USERS AROUND THE WORLD ARE BUILDING AND DEPLOYING 'BUSINESS-CLASS' NETWORKS

The wide-area networking (WAN) paradigm of choice around the world appears to be Asynchronous Transfer Mode (ATM) over optical fiber. This combination offers many enterprise users the maximum cost-effective combination of bandwidth, scalability, flexibility and support for a wide variety of well-established networking and applications protocols.

How close organizations get to this networking Holy Grail, however, depends in large part on where they're starting from.

In Asia, as in Africa and Latin America, bandwidth is usually very limited, and very expensive where it is available, according to Hong Chen, CEO of AimQuest Corp. in Milpitas, Calif., which has developed a global network of Internet service providers (ISP). A T1 line run for a few miles can cost thousands of dollars in Taiwan or elsewhere in Asia, compared to hundreds per month in the U.S.

In China, users are charged based on the number of characters they transmit, which can make data communications services prohibitively expensive, especially for users of data-intensive applications. However, since many regions in Asia have little infrastructure in place, they are moving directly to frame relay and ATM over fiber-optic lines, which should lower networking costs and expand available options within a few years.

In Europe, WAN options — including the Internet — are more widely available. Several ISPs have recently announced plans to build high-capacity points of presence across the continent. Since the vast majority of today's international Internet traffic is routed through the U.S., more POPs in Europe will increase worldwide Internet capacity and decrease transmission delays in and around Europe.

And in North America, high-capacity networking alternatives are widely available, although local carriers are decidedly inconsistent in their understanding and ready provisioning of such services.

Users, therefore, are justified in feeling a bit of despair in response to the roiling forces buffeting their WAN plans.

Despite the conflicts and confusion, users around the world are building and deploying "business-class" networks. Here are some brief glimpses into their strategies, successes and challenges.

IN BRAZIL:

To establish a WAN among its Brazilian and foreign offices, Companhia Vale do Rio Doce (CVRD), the world's largest producer and exporter of iron ore, works with a combination of the Brazilian national telco, EmBratel, its own railway system and foreign carriers. The local railroads, which CVRD owns, are the only companies in the country other than EmBratel to own infrastructure.

EmBratel and the railways link CVRD's offices in Brazil with

technology including fiber-optic and satellite links. AT&T and Embratel run the Diginet point-to-point, 64K bit/sec. link between New York and Brazil. The New York-Tokyo link is a frame-relay connection managed by AT&T and KDD of Japan.

IN HONG KONG:

In the late 1980s, when it changed its analog circuits to digital, The Hongkong and Shanghai Banking Corp. (HSBC) initiated minimum-level-of-service agreements with the telcos it deals with around the world. And HSBC sends a monthly "report card" to each critiquing the previous month's service, notes Tim Cureton, head of group telecommunications.

HSBC has found that as a multinational firm, it often had to play a mentoring role for its telcos, as they began doing business outside their traditional domestic markets. "[The carriers] lack global cohesiveness, and, often, a transnational corporation such as ours is much better at it," he says.

The company has found that mentoring and service agreements provide more reliable networking than dependence on so-called "global" alliances. " 'International' to most carriers means London, New York [and] Tokyo," Cureton says.

This presents a paradox to companies such as HSBC. Emerging markets, the places where the company's potential margins and profits are highest, are also the places where public networking infrastructure is often the least well developed. This situation requires multinational corporations ultimately to be self-sufficient in delivering full access to their affiliates, Cureton notes.

IN AUSTRALIA:

"Mulligatawny" is a popular soup from Australia, containing an interesting mix of ingredients. Qantas Airways Ltd., the national airline of Australia, is implementing a similarly mixed solution to its WAN needs.

Frame relay is being introduced across the company's network environment as the primary wide-area data-delivery method. The core of the "campus" networks in Australia is going to be ATM, but overseas and in the outback, where ATM isn't supported, the airline will use frame relay. Links to developed offshore areas such as London or the U.S. will be via leased lines running ATM protocols, while ISDN links will provide backup switch connections.

Qantas will lease lines from carriers where service levels can be guaranteed and implement private circuits where carrier inadequacies dictate, within budgetary reason.

Dortch is a freelance writer in San Francisco.

Remote but not removed

UNTETHERED USERS STAY IN TOUCH WORLDWIDE VIA VARIOUS TECHNOLOGIES

by MINDY BLODGETT *and* KIM GIRARD

Wireless communications — that group of technologies that includes cellular and satellite, among others — may be struggling for acceptance in the U.S., particularly where sending and accessing data is concerned. But users in other parts of the world are increasingly forsaking terrestrial ➤

lines and turning to wireless to satisfy their mobile needs.

Industry analysts, for instance, estimate that globally, more than 125 million subscribers — two-thirds of them outside the U.S. — used some form of cellular technology for mobile communications last year, triple the 1994 figure of 41 million worldwide subscribers.

GLOBALLY, MORE THAN 125 MILLION SUBSCRIBERS USED SOME FORM OF CELLULAR TECHNOLOGY FOR MOBILE COMMUNICATIONS LAST YEAR, ANALYSTS ESTIMATE.

Even in the U.S., the market for wireless business systems is expected to grow from $126 million this year to $958 million in the year 2000, according to Phillips InfoTech, a telecommunications consulting firm in Parsippany, N.J.

But as the numbers of wireless and mobile users grow, users the world over share some common problems, including the high cost of service, the lack of technology standardization and the difficulty of roaming.

STANDARDIZATION EASIER

The issue of standardization is less cumbersome in Europe and Asia than in the U.S. In Europe and throughout Asia, the most prevalent wireless technology is a type of cellular called the Global System for Mobilization (GSM). While GSM is used primarily for voice, its providers hope to evolve it into enhanced data and Internet connectivity services as well.

Craig Mathias, an analyst at the Farpoint Group in Ashland, Mass., says GSM is available in about 75 countries. The advantage of GSM in Europe is

that there is only one standard in use, which eases problems with roaming and interoperability between competing services. In the U.S., there are multiple standards for GSM, as well as for other forms of wireless communication.

Overseas, GSM is easier to use, as one computer-aided design (CAD) company has found. Intergraph Corp., a $1 billion multinational workstation and software manufacturer, has assigned its salespeople and service engineers in Germany notebook PCs and GSM phones. Using a GSM phone on Mannesmann AG's D2 GSM network, employees can call into the office and connect to a remote-access server by clicking on a Windows 95 icon. This initiates a call from the GSM phone to an ISDN line, enabling the user to get on the network. The system also enables callers to leave messages on a toll-free number; these can then be forwarded in text to the engineer's GSM phone.

While this approach can work abroad — in Germany, for example, 100% of the population is covered by GSM — what's holding wireless back in the U.S. is cost and a lack of knowledge of its benefits, Mathias says. "Lots of companies are learning about it the way they had to learn about PCs and LANs," he says.

An increasingly popular device running on GSM is the "smart phone," which combines voice, data and computing capabilities in a small handset. Recently, Motorola, Inc. announced the first GSM dual-mode phone, which works with other wireless technologies as well. The Nokia 9000 communicator, a smart phone from Nokia in Finland, has been very popular in Europe as well.

Another wireless technology gaining popularity in both the U.S. and Europe is Code Division Multiple Access (CDMA). U.S. wireless device manufacturers, such as Qualcomm, Inc. in San Diego, are pushing this to be the standard.

WHERE THE SAVINGS ARE

Many companies are using international intranets or satellite communications to avoid the expense of local infrared or

remote cellular communication, both of which are prohibitively expensive, industry observers say. For instance, Ethernet PC cards offering 10M bit/sec. connections cost about $50, while a wireless network interface card is about $500 and gives only 1M to 2M bit/sec. connections.

No longer considered solely a medium for backup transmissions, satellite use is increasing in the U.S. For instance, Wiest Truckline in Jamestown, N.D., is using a hybrid satellite and wireless data system from Rockwell Semiconductor Systems, Inc. and The Ardis Co. The company replaced its cell phones with 52 remote units installed in trucks. The system, which uses the global positioning system (GPS), a shared satellite system, enables dispatchers to track truck locations by computer. Truckers, who use a keyboard installed in the truck, can send and receive delivery information.

"Purchasing the [remote] system [and leasing satellite time] is more expensive, but when you look at the control you have, it pays off in the end," says Kristina Huebschwerlen, the company's financial controller. Though each system costs about $4,000, the company no longer pays cellular bills, which could run up to $700 a month for just one truck. Although roaming cellular service can be dicey, truckers can always be reached on the road with the satellite system.

Regardless of the new wireless technologies emerging in the U.S. and abroad, Mathias says satellite will likely remain the more popular technology in the coming years, as many competing companies will make the service affordable and enable users to communicate from anywhere in the world. But cellular communication will also have its place, he says.

"Eventually, you'll be able to send faxes and data with handsets," he says. "They'll really filter into the business and consumer market."

Girard is a senior writer, mobile computing, at Computerworld. Blodgett is a former Computerworld senior editor.

Nets around the world

THE CHALLENGES AND
ACHIEVEMENTS OF
SOME NETWORK 25
COMPANIES

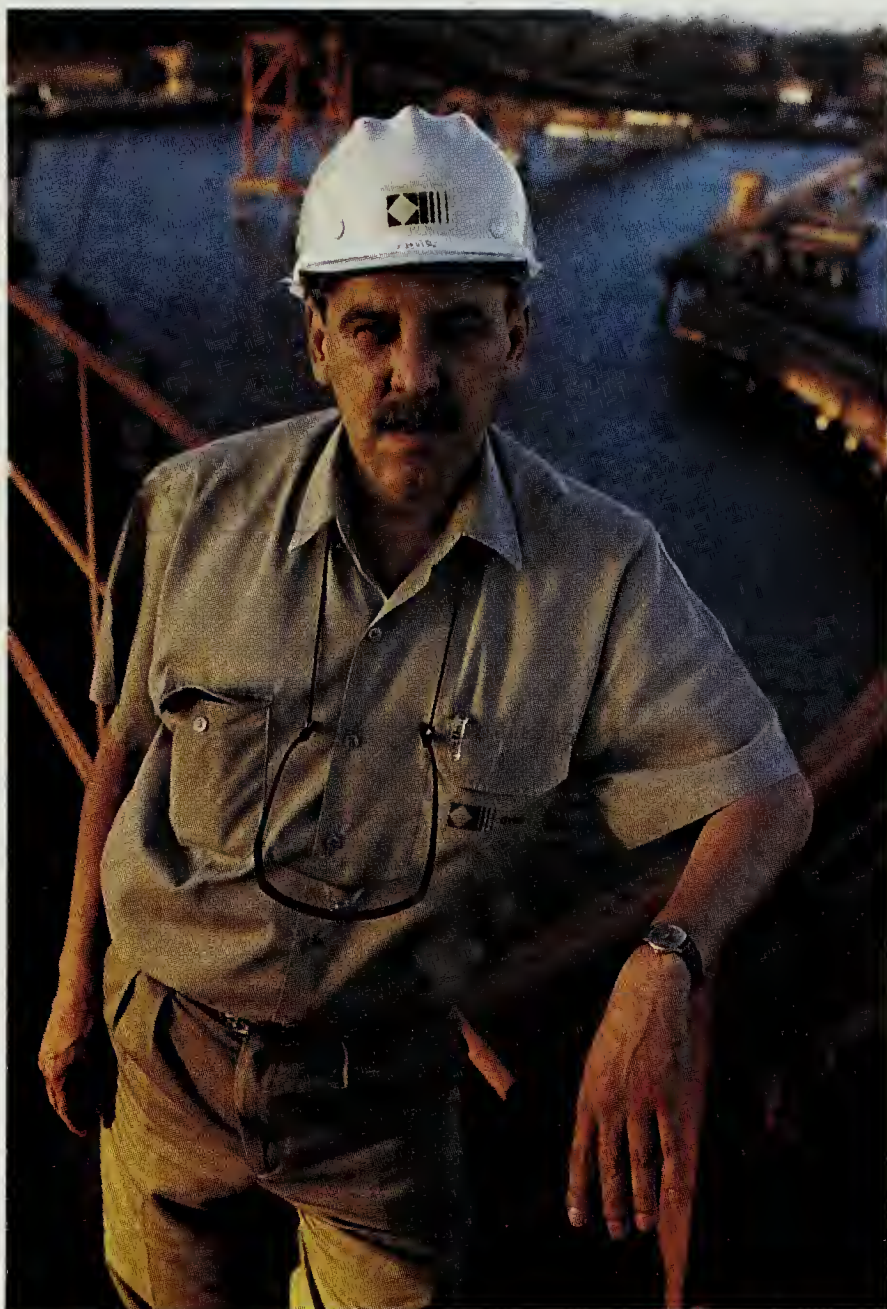# IRONCLAD CONNECTIONS

BRAZILIAN MINE'S
NETWORK HELPS MOVE ORE

TADEU GUIMARAES *In retrospect, CVRD would have done some things differently. "If we were building the network now, certainly we would implement frame-relay technology instead of point-to-point protocols."*

by MARC FERRANTI

When a shipping office in Tokyo wants to know the status of an order of iron ore coming from the depths of an Amazonian mine, chances are the information will be transmitted over Companhia Vale do Rio Doce's (CVRD) global network.

That's because Brazil-based CVRD is the world's largest producer and exporter of iron ore and has constructed a voice and data network, dubbed CVRDNet, to track material and manage logistics for its vast railway and port systems.

Four years ago, CVRD embarked on the mammoth, mission-critical application and networking project that last year resulted in CVRDNet. The total cost hasn't been calculated, because of Brazil's skyrocketing inflation during some periods of the four-year project (up to 100% per month, says one company official) and the project's multiple phases. ➤

"All the aspects of building the network were difficult," recalls Tadeu Guimaraes, marketing department manager for CVRD's information systems management group. "The most difficult thing is we had several layers of hardware and software and several suppliers — it's a heterogeneous environment." Working with suppliers as partners and having a skilled networking team helped, he says.

CVRD transports ore from mines to ports along the railway systems it owns in Brazil: the northern 890-kilometer Carajas Railroad from the Amazon region to the Ponta da Madeira Marine Terminal, and the southern 700-kilometer Vitoria-Minas Railroad running from the state of Minas Gerais to the Tubarao Marine Terminal.

The railways carry 100 million tons of ore per year, not to mention 50 million tons of commercial freight and 2.5 million passengers.

On the application side, several host-based programs were developed to control railway and shipyard logistics. One application schedules trains, using an in-house developed, fuzzy-logic artificial intelligence system. Other modules monitor trains as they're moving, manage passenger reservations and control ship loading.

On the network side, CVRDNet links the company's geographically dispersed Brazilian offices to the host-based applications and lets them communicate with offices around the world. However, only Brazilian offices, including those in Rio de Janeiro, Vitoria, Sao Luis, Carajas, Itabira, Belo Horizonte and Aracaju, have direct access to the tracking applications.

The foreign offices use Lotus Development Corp.'s CC:Mail over CVRDNet to query Brazil offices about the status of orders.

The host applications run and store data in an IBM CMOS processor-based mainframe running the DB/2 database on the MVS operating system. Users access the data via terminal emulation over CVRDNet, a multiprotocol network incorporating TCP/IP, IPX, SNA and NetBIOS. Connections include 2M bit/sec. microwave

connections from Embratel, the national carrier, as well as fiber-optic links and lines laid along the CVRD railways.

The international side of CVRDNet consists of various types of connections among offices in Brazil and New York, Tokyo, Shanghai and Brussels, using different telecommunications companies and technologies.

For example, the Brazil-New York connection is a dedicated, point-to-point 64K bit/sec. link managed by AT&T and Embratel. The New York-Tokyo link is a frame-relay connection managed by AT&T and KDD of Japan.

Other links include a Brussels-Brazil connection managed by the Belgian national carrier Belgacom and Embratel, while the Tokyo-to-Shanghai link is set up using Infonet Services Corp.

CVRDNet and the related materials-tracking applications have had numerous benefits, according to Guimaraes. Among the main ones has been increased customer satisfaction as customers were kept better informed about order status at a time leading up to the privatization of CVRD, which was completed this year. Secondly, better control of railway logistics has reduced train breakdowns.

In retrospect, some things would have been done differently, Guimaraes says. "If we were building the network now, certainly we would implement frame-relay technology instead of point-to-point protocols" throughout CVRDNet internationally, Guimaraes says.

This is because the next big IT project involves moving to client/server technology, with more of the application data residing in local offices on Oracle Corp. databases, Guimaraes says. To do this, CVRD will have to upgrade CVRDNet with frame-relay links worldwide.

"The client/server migration is being done mainly to align our systems with the market — our users' — requirements, increase productivity in back-office operations, [and] add more value to the company's businesses," Guimaraes says.

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Ferranti is New York Bureau chief for the IDG News Service.

DRILLING

INTRANET
FUELS UPGRADES
AT BP

by RON CONDON

At U.K.-based British Petroleum, experts in the exploration and refining of oil and associated products can be at opposite ends of the earth. That's why BP is rolling out a global intranet and using desktop videoconferencing to create virtual teams.

"The main benefit is the way BP can operate in distributed teams, gaining access to people and information wherever it resides and by networking around the globe," says Andy Haywood, BP telecommunications team leader. "It allows them to form focused groups looking at refining, IT or any other aspect of the business."

BP is now in the midst of upgrading its 32,000 PCs in 100 countries to ensure they all run Microsoft Corp.'s Windows 95, Office and Exchange and are all equipped with a Web browser to access the intranet.

In 1996, BP had a $500 million information systems budget, $90 million of which was spent on networks. Its IS staff totaled 750 and its networking staff 20, with additional positions that were outsourced.

With the upgrades, the intranet and the emphasis on videoconferencing — 950 users have Intel Corp. ProShare for videoconferencing and application

FOR DATA

PCs are used at BP's 8,000 gas stations in the U.S. to process orders, track competitors' pricing and communicate with other parts of the company. The boxes are being upgraded as part of the companywide effort.

sharing — Haywood says the company has yet to predict where bandwidth needs to be increased on the network. "We don't want to provide bandwidth just in case there is demand, nor do we want to provide [it] just too late," Haywood explains. "The target is to provide an acceptable performance just in time."

But the company does know that frame-relay managed services figure prominently in its overall plans.

That's because they are scalable and flexible — as well as cheaper than leased circuits. Where necessary, ISDN will be used to provide extra bandwidth for videoconferencing.

"We are looking to use techniques such as RSVP [Resource Reservation Protocol] to give us some degree of quality of service across the network. The alternative could be ATM in certain areas — but that is not currently in the plans," Haywood says.

BP used to have its own private communications networks, but most of these have now been replaced by managed services from communications providers, allowing BP to focus on its core business.

The promised liberalization of world telecommunications will help this process, and BP would eventually like to work with a global provider, though even now the main contenders for that mantle — BT/MCI, AT&T

and partners, and the Global One consortium — do not reach every corner of the globe.

The standardization push also extends to the supplier level. In the past, decisions were made locally, resulting in different divisions ending up with different equipment.

For example, while the company uses a mix of equipment from 3Com Corp., Bay Networks, Inc. and Cisco Systems, Inc. for its internetworking needs, the plan is to choose a single supplier that is capable of providing and supporting products anywhere in the world.

The next stage in communications development, according to Haywood, will be the creation of extranets to allow communications with customers and suppliers, but this is still in a pilot stage.

Condon is London correspondent for the IDG News Service.

Ready for Takeoff

AIRLINE'S NEW NETWORK COMES OUT FROM DOWN UNDER

Qantas' multicolored Nalanji Dreaming design debuted in 1995 to celebrate the balance and harmony of nature in Australia. The airline is seeking to balance its functions on a new network, as well.

by JON SKILLINGS

The route map in the in-flight magazine doesn't exactly correspond to the network layout at Qantas Airways Ltd., but it's a good place to start in understanding the extent of the company's IS challenge.

A $5.7 billion (U.S.) company and the 10th largest airline in the world, Qantas runs 4,200 flights per week to 96 destinations throughout Australia and around the world. Wherever its planes land, it has employees — flight staff, reservations agents, mechanics — who depend on a network that needs to be as streamlined and efficient as a modern passenger jet. Without it, they couldn't book seats, check in passengers or move meals or spare parts, among other functions.

The Sydney-based company has started to redesign its transaction-based

network, propelled by its 1992 acquisition of Australian Airlines, its own accelerating growth and the sheer accumulation of older technologies.

Consider, for instance, the protocol stew at Qantas, currently a mix that includes TCP/IP, IPX, Unisys LLC, Unisys U100, SLC, Synchronous Data Link Control and X.25.

The yoking of the two airlines' networks also made significant cost and reliability demands at the same time that new technologies and bandwidth requirements cried out for attention. Of its $220 million information systems budget for 1996, $75 million was earmarked for network projects.

"We're doing a complete revamp," says Michael Dodd, Qantas' manager of technical services. "We're going to rebuild from scratch using contemporary technology to carry us forward."

The first parts of the new client/server arrangement, which will be in place by December, equally affect the three components of the network — campus, national and international. They will be connected via a fully redundant, high-capacity backbone. The new network will move Qantas onto a single protocol, TCP/IP, phasing out legacy protocols over time. The hierarchical design will have core, regional and site layers, and connection to the core will be at E1/T1 speeds or faster. Ethernet and Fast Ethernet will be the interim switching solution, followed by a migration to Asynchronous Transfer Mode (ATM) as it becomes widely available. Full internetworking between frame relay and ATM will be required.

REQUIREMENTS ANALYSIS

The project started months ago, when the redesign team set out to understand what the business units wanted and where they saw themselves going. The goal: To give Qantas a network that is strategic and supports the business, Dodd says. The process suggested essential elements of the redesign and also let the line units know that they wouldn't be getting new technology just because the technologists said so.

"It was important to get the buy-in from those units," Dodd says. "You've got to get them to say, 'Yes, we really want this to happen because it's good for us.'"

At the same time, the redesign staff had to keep a sharp eye on costs. "If we spend a dollar, we want to get a dollar's worth," Dodd says.

Electronic commerce does not loom large in the near future, but the Internet does have a role to play. In July, Qantas refurbished its year-old Web site, giving it a new look, offering more information on schedules and letting frequent fliers plan itineraries (with proper security measures) in the first of a series of planned improvements.

As the old goes out and the new comes in, Qantas has to make sure that everything continues to run as smoothly as it did before. "All those things," Dodd says, "depend on a stable network being in place."

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Skillings is former Asia Pacific Bureau chief for the IDG News Service.

BETTING ON ATM

CANADIAN CASINO CLAIMS IT'S A WINNER

by DEANNE N. GAGE

To keep up with expected rapid growth in its gaming operations, Canada's Casino Windsor anted up in 1996 with Asynchronous Transfer Mode (ATM) technology.

The government-owned casino gambled that the multimedia networking technology could supplement an outgrown Token Ring/Ethernet assemblage by more effectively supporting the high bandwidth, continuous requirements of its business. The Windsor, Ontario-based casino wagered on an ATM backbone despite claims that the technology is still unproven and expensive.

ATM, with its integrated data, voice and video capabilities, is still considered bleeding edge in Canada; only 4% of companies use it. But the high-stakes gambit appears to have paid off.

"We saw it as leading-edge technology that could grow with the casino," says Mike Murphy, Casino Windsor's director of MIS, noting that the ATM network, provided by Digital Equipment of Canada Ltd., supports everything from gaming to business administration. "So far, it's been very reliable."

ATM is ideal for running the casino's bandwidth-intensive gaming applications. With slot machines, for ➤

How 3Com built a network

example, gambling data is collected on a circuit card and then passed over the network to an AS/400 server for compilation, Murphy explains. Gamblers' signatures are even verified over the network, he adds.

The hybrid ATM network links various facets of the casino, including the main casino, three administrative buildings and a riverboat casino on the Detroit River, eliminating the need for wireless or satellite links.

"Currently, we're mainly using [the ATM] so we can communicate with each branch of the casino," Murphy explains, noting that he's hoping to

provide intra-site communication in the future. "Can you get a [networked solution] for cheaper? Absolutely. But we like to compare it to buying a car. We bought a Cadillac: It's a very expensive solution, but it's also something we can grow into."

The casino's expected move into a new headquarters in Windsor early next year demonstrates why it needs a network that can grow as the company expands. The new facility, which will boast a 400-room hotel, will put even more systems on the network, including large multimedia applications that would provide Internet access and online room accounting.

"We also want to scan images and data and wave sounds over the ATM [to do video gambling]," Murphy says.

But gaming applications aren't the only data pulsating across the ATM network. Also attached to the network are business-critical systems: roughly 300 PCs connected to two AS/400s (which process all financial and gaming applications) across five sites; two Novell, Inc. servers; a SCO, Inc.

machine; two RS/6000 machines; security; and computer output to laser disk. The network supports multiple protocols, including TCP/IP, IPX, IP, SNA and Data Link Control.

All this activity underscored Casino Windsor's need for high-speed transfer capabilities, says Dan Ford, president of Windsor, Ontario-based Applied Computer Solutions, Inc., which installed the network in February.

"The initial need was to connect multiple sites and do it with enough bandwidth to have real-time applications running video and possibly teleconferencing and imaging. So the traditional method of connecting sites, using routers and 56K bit/sec. lines, just wouldn't work," he explains.

Murphy offers the following advice for corporations looking at adopting an ATM network: "Make sure you have a strong service provider who understands networking."

Gage is a senior writer at Network World Canada, a Toronto-based affiliate of International Data Group.

NET WORTH

GLOBAL BANK PUTS STOCK IN FRAME RELAY

by JON SKILLINGS

The Hongkong and Shanghai Banking Corp. (HSBC) sends packets over its network the way the imperial Romans dispatched chariots along their fabled system of roads, bringing together the benefits of a central administration and the advantages of a local presence in far-flung climes.

"One of the strengths of having an integrated telecommunications network of global size is that you can move systems and you can move corporate philosophy very rapidly from one part of the world to another," says Tim Cureton, the bank's head of group telecommunications.

That means HSBC has been able to place functional groups where there is expertise — so treasury and legal are in London, mainframe development in Vancouver. And the bank could, if necessary, move a data center from Tokyo to Hong Kong or a computer center from Oman to Dubai.

That flexibility is important for an organization that, along with subsidiaries such as Midland Bank in Europe and Marine Midland Bank in the U.S., has more than 600 offices in 32 countries — and is still growing. Of its $1 billion information systems budget for 1996, more than $100 million was spent on networking.

"Once we have a beachhead somewhere, customers have to have access to everything we have — every system," Cureton says. From their desks, employees must be able to access any server — provided, of course, they have permission. For instance, all dealers in treasury services — money markets, derivatives, foreign exchange — use the same front-end system. That allows HSBC to "do more for less," Cureton says. "While IT budgets across the banking industry tend to be 22% of overhead, at HSBC, the IT budget is 15% of overhead."

HSBC is in the first stages of a six-year move from a mixed router and packet-switching network to one built around frame relay, a technology that Cureton says can be used for almost everything from SNA (generated by a bevy of AS/400s) to LAN and voice traffic. In a year or two, the bank may base the core of the frame-relay network on Asynchronous Transfer Mode (ATM), but for now, ATM remains "a bit of a campus LAN toy," he says.

"The strategy is, there shall only be one network," both geographically — "whether it is the Timbuktu office or the Tulsa, Okla., office" — and vertically, for handling voice, data, videoconferencing and so forth, Cureton says. "We haven't achieved that ideal yet," he adds.

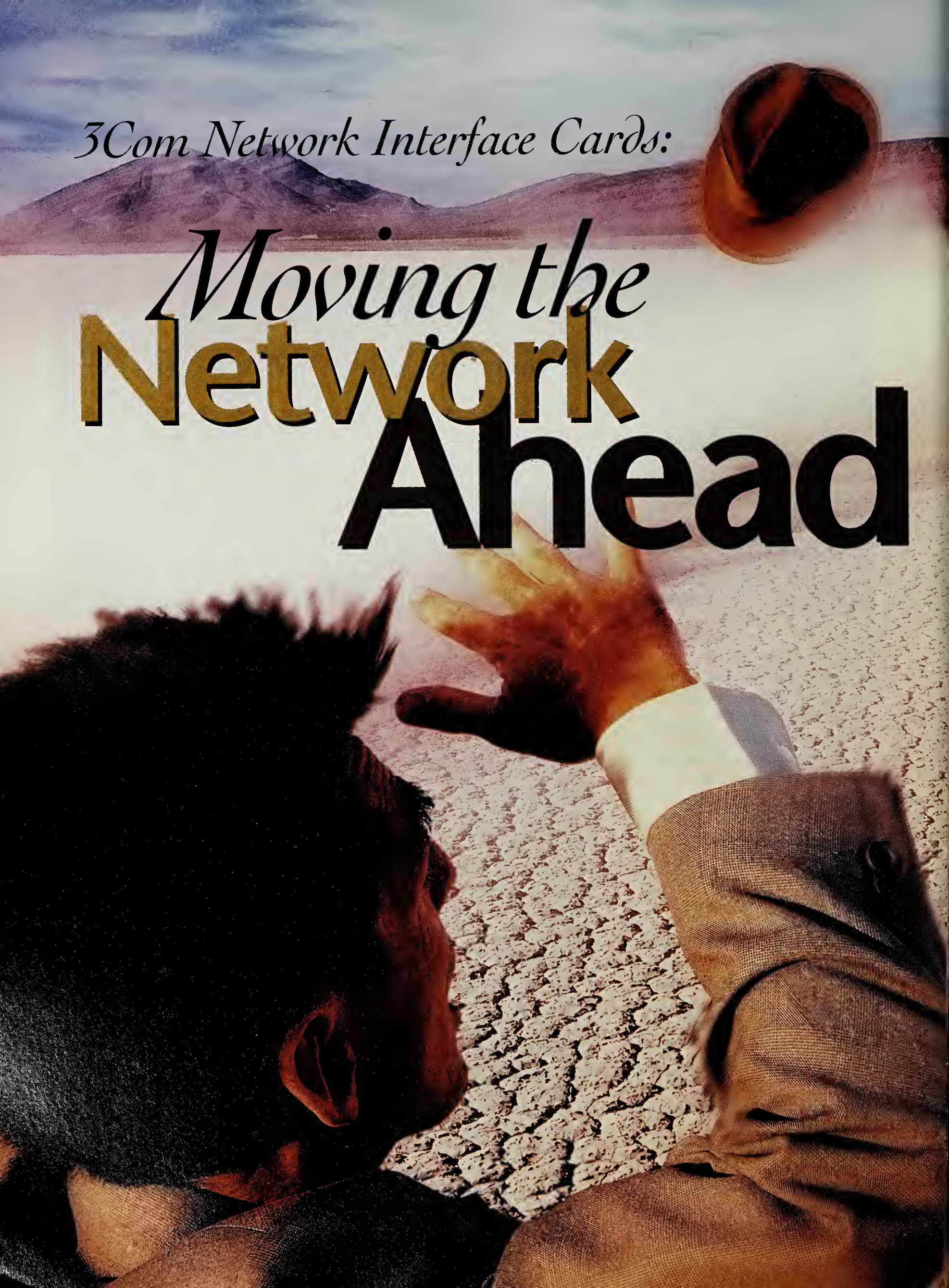*Skillings is former Asia Pacific Bureau chief for the IDG News Service.*

TIM CURETON

One of the strengths of an integrated telecom network is "you can move systems and you can move corporate philosophy very rapidly from one part of the world to another."

PHOTO: ADRIAN BRADSHAW/SABA

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GLOBALLY SPEAKING

U.S./CANADA

Carrier connections

by TOM NOLLE

For all the hype of networking change wrought by deregulation and industry reform, a network manager from the early 1980s would be pretty comfortable with most of the carrier services and equipment options offered today. Nine out of every 10 wide-area networking dollars is still spent on traditional phone and leased-line services. But things change, and for carrier services in North America, big changes are in the wind.

In the next 25 years, networking will move from a leased-line-dominated set of practices to an almost complete dependency on carrier value-added services. Plain old T1 and digital transport will give way to frame relay, Asynchronous Transfer Mode (ATM) and IP connections.

Managed services that provide buyers with guaranteed bandwidth, delay, packet loss and maintenance response time will augment and eventually replace much of the internal network support process. These service trends will link the business users of networks more directly to network service providers. Is this good for those of us in the field? It doesn't really matter because it's inevitable.
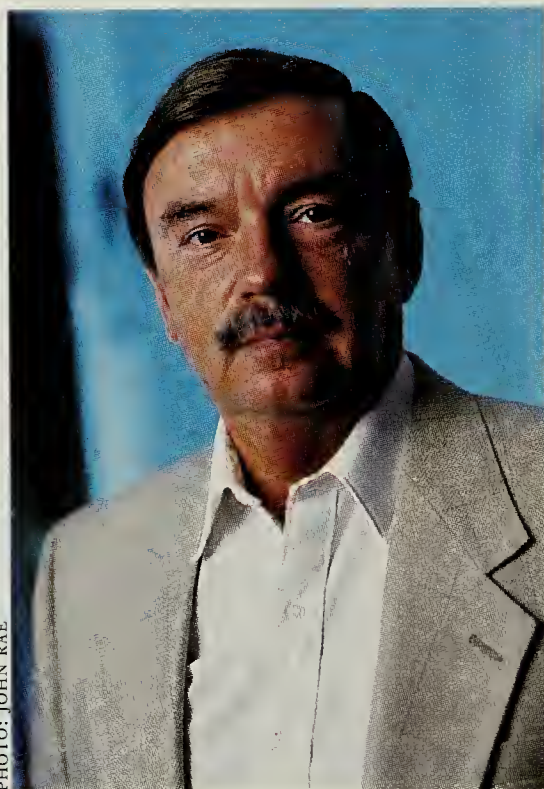
The future is starting on our desks. It's clear that IP will play a major role in the "new" networks. Desktops today consume LAN protocols, and it's clear that IP is going to dominate premises networking and application development. The growth of the Internet is a visible indication of the value of IP, but it's the corporate commitment to IP and the large corporate budgets to support that commitment that will reshape carrier services in the IP space.

Virtual private data networks with guaranteed performance levels will be built on IP over the next decade, and by the year 2015 this type of network service will dominate data transport. While we don't believe IP will ever replace voice telephony, IP will garner the portion of voice communications that's associated with multimedia collaboration, and that may be the fastest-growing niche of the voice market.

At present, carriers are trying to break into new business applications because current telephone technology isn't proving cost-effective. Multimedia is neat, though workers won't be using it all the time. Today's networks can't recover bandwidth targeted at supporting multimedia collaboration when the workers are off eating lunch or producing goods.

Frame and cell networks — the value-added network technologies of the last few years — are far better at recovering wasted bandwidth and thus better at containing bandwidth cost. To fill the new demand niches, we'll see carriers shifting increasingly to switched services for frame relay, ATM and connectionless services such as IP.

High Price to Pay

Why hasn't this shift already happened? In the U.S. market, it's because of network access costs — the local loop.

Traditionally, users have paid 30% to 40% of their telecommunications dollars for about four miles of local access connection. Competition arising out of the Telecom Reform Act of 1996 will certainly drive local access prices down and at the same time create a new set of services such as those based on the various digital subscriber loop standards.

The biggest improvements in price,

in fact, will probably come on copper-based services at T1 rates and lower, making the local access bandwidth bonanza more a branch office and home office plus than one targeted at headquarters. That will reverse a long-standing trend of anemic support to the network's edge, where most customer contact really occurs.

To the North

The Canadian market's demand issues are much like those of the U.S. market, but carrier conditions are quite different.

In Canada, long-distance bandwidth is very expensive, and governmental policies on telecom reflect the need to provide basic telephony services to a population thinly spread across a giant geography. Frame relay's popularity in Canada suggests that value-added services such as frame relay or ATM will be deployed to conserve this expensive bandwidth and lower data communications costs to businesses. Given the high cost of traditional leased lines in Canada, it is very likely that Canadian telecommunications will move faster to a frame/cell basis than its U.S. counterpart.

There are a lot of forces acting on our networks, and that means future networks aren't going to be all ATM or all IP or all anything else.

It's exciting to think that a new technology concept such as ATM could sweep everything out of the LAN and WAN and give us a uniform architecture to face the future with. But it also ignores the different business pressures that apply to LANs and WANs, and without basic agreement on issues, it would be purely a coincidence if we achieved agreement on technology.

For the next 25 years, our choices and problems in networking will be more complex than ever, and that's the truth.

Nolle is president of Cimi Corp., a Voorhees, N.J., network consultancy.

EUROPE

Wide priorities

by JOHN MATTHEWS

PHOTO: P. JORDAN/NETWORK/SABA

As more employees work at home at least part of the time, as offices increasingly require more rapid information exchange, European network managers — like many of their counterparts around the world — are making wide-area networking their top priority for the near term.
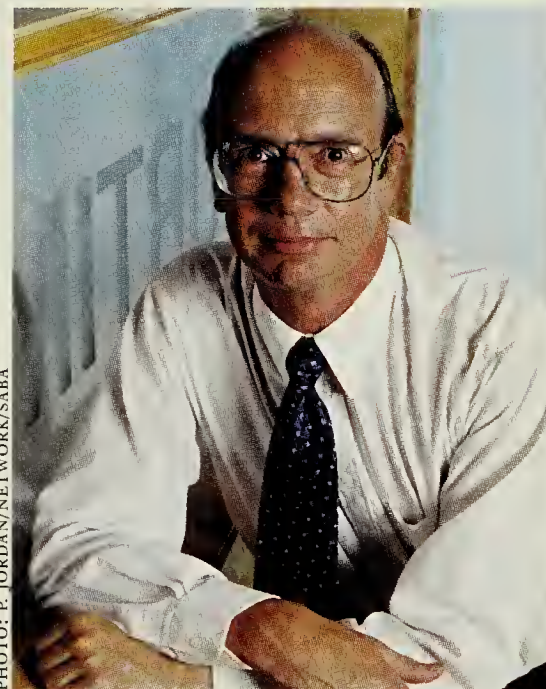
Network managers who want to implement or manage a successful WAN in Europe will find that a bewildering array of technologies, compatibility issues and high prices awaits them. The liberalization of the European telecom market may eventually change things — its implementation date is less than six months away, though various countries have already obtained extensions. But in the interim, take note of this confluence on the Continent:

Compatibility

If travelers across Europe have problems attempting to plug their PCs into the local phone sockets, the network manager must contend with the different wide-area services, equipment and interfaces of different countries. Despite the introduction of a "single market" in 1992, even the countries of the European Union (EU) are still more than a dozen individual markets as far as telecommunications is concerned. There is even greater diversity in the countries outside the EU and in the former Warsaw Pact countries.

Price

The broadband network capacity required for European networks doesn't come cheap. A 34M bit/sec. circuit in Europe can cost up to three times the price of a similar circuit from Nynex Corp. The situation is even worse when the circuit crosses a national boundary. Users hope competition will bring these prices down; in the U.K., long-distance call prices have fallen by about 60% since full competition started in 1992.

Technology choice

National preferences and the interests of the incumbent telco largely influence the technology used, and there are a number of options. European companies expect to spend less on X.25 and leased circuits as these technologies are replaced by such technologies as the following:

■ Asynchronous Transfer Mode (ATM). To support broadband in the WAN, many of the big European telcos have introduced ATM in their backbones and launched ATM services to end users, but these are priced at a premium (except in Finland) and ➤

are not actively marketed. However, ATM continues to be regarded as the long-term networking solution to support voice, data and multimedia on the same network.

■ Frame relay. Though some of the major telcos in Europe have attempted to push Switched Multimegabit Data Service (SMDS), this has not been universal, and users have voted with their pocketbooks for frame relay, which is more cost-effective. As a result, frame-relay usage has grown rapidly recently — 80% last year.

■ ISDN. Integrated Services Digital Network (ISDN) has finally (after nearly a decade) begun to take off in the past 18 months, driven largely by very attractive marketing and pricing in Germany. Monthly rental of an ISDN line is now $29 there, compared with $32 for two analog lines.

One point of all these technologies is giving remote access to workers at home. The vast majority of home workers use a modem on the public switched telephone network, but this is becoming painfully slow for the fastest-growing applications: multimedia electronic mail and browsing the Web. ISDN improves things slightly, and European telcos are testing many of the solutions being proposed from North America: Asymmetric Digital Subscriber Line (ADSL) cable modems and increased use of fiber in the local network.

User demands are becoming increasingly sophisticated, and applications seem to require more bandwidth by the day. It's all a network manager can do to keep up, and all we can do to be patient.

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Matthews is an analyst specializing in voice and data networking at Ovum Ltd. in London.

ASIA

Growing strong

by GIGI WANG

sia is often compared to Europe because it is a continent of diverse nations. But unlike Europe, Asia has a pronounced disparity among countries in terms of gross domestic product (GDP), information technology spending and technology adoption. Another distinction: Asia is economically dominated by a single country — Japan.

Japan's GDP is more than half that for the entire continent: $4.48 trillion, of a total $7.9 trillion. International Data Corp. (IDC) research shows that Japan accounts for approximately 75% of IT spending — some $85.1 billion — and 50% of all PC shipments there. Consequently, technologies dependent on PC proliferation, such as LAN usage, are also dominated by Japan.

Yet economic forces show changes are in the works. Korea follows Japan as the Asian nation that spends the most on IT as a percent of GDP: $5.8 billion in 1996. But China, with $5.53 billion spent last year, is fast closing in, and IDC predicts it will overtake Korea by the end of the decade.

PHOTO: JOHN SOARES

Network spending will be part of this boon as multinational corporations look to maintain networking standards around the world and resolve the problems with their networks in parts of Asia. Many of these problems are due largely to the variation in wide-area data services and the relative inexperience of users in installing and managing newer networking technologies.

Overall enterprise network technologies used throughout Asia, from hubs to switches, are the same as those used in the U.S., though local vendors are often more popular than U.S. brands due to price. The major challenge for building networks in Asia is not technology adoption but getting consistent wide-area data services from the carriers in each of the Asian countries, as services such as frame relay aren't available uniformly.

Asynchronous Transfer Mode (ATM), however, is expected to grow rapidly in the next five years as equipment prices decline rapidly and governments and vendors mount a strong push for its use. In Korea, for example, a large market and high user demand for high-speed, sophisticated networks will likely fuel ATM growth. In Malaysia, the government is pushing ATM for its Multimedia Super Corridor project, a plan to build a networked "cybercity" with private and public money.

The challenge for ATM deployment, of course, will be the relative lack of ATM technical skills, as well as the ubiquitous high management costs. And even if ATM is available, companies won't necessarily start using it.

Users in Asia, like users everywhere, are waiting for applications that will justify ATM usage. An upgraded infrastructure alone doesn't drive usage. Look at Singapore, where a new fiber-optic phone network with state-of the-art equipment has not significantly increased ATM usage.

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Wang is a senior vice president at International Data Corp.

LATIN AMERICA

Internet opportunity

by CLAY RYDER

The Internet is pretty much a given for those in English-speaking countries with deregulated telecommunications infrastructures. That's not the case in Latin America yet.

If there's a common thread of Internet use around the world, it is that the acceptance and growth of the Internet/intranet is highly dependent on a country's particular political and societal goals rather than whether fiber-optic cable is connected to every home or office. This holds especially true in Latin America, where the potential is unarguably high, but significant political issues that transcend technology will ultimately dictate the pace of Internet deployment and hence its market opportunity.

Because of the unfettered communications potential of the Internet, for instance, many governments south of the lower 48 will likely stymie its proliferation. Much of Latin America remains threatened by political repression and socialism, and the threat of more control over communications is very real. This resistance may come in many forms, including fiat, laws, regulated pricing, equipment costs, equipment certification and supplier vetting. These means may limit the Internet connection potential of the population, causing slower growth than in North America.

Yet Latin America's low to moderate level of Internet activity does appear to be on the rise (see related story page 17). And its potential is driving the development of the wireless communications

markets. As in other areas of the world where the land-based infrastructures are limited, wireless solutions — if allowed to be competitive and detached from the government or government-controlled Postal Telephone and Telegraph authorities — could provide a significant market opportunity. Satellite-based networks, for instance, represent new connectivity potential for businesses.

Stable Infrastructure

The network infrastructure itself is stabilized in all major countries and markets in the region. Argentina, Chile and Brazil have achieved the highest degree of political and financial stability. Argentina and Brazil boast the largest number of Internet service providers (ISP), and Brazil claims the largest number of seats, domains and ISPs. Historically, Brazil's is a difficult information technology market, but it is becoming less so with reduction in tariffs.

Argentina and Chile have privatized much of their telecom infrastructure and are seeing investments by major European and North American telecommunications companies.

Peru seems ready to move into the same category as Argentina or Chile, with one exception — the Peruvian government is limiting political and personal freedom for the sake of quelling the historical rebel group Shining Path.

Chile and Mexico, in contrast, are slightly less regulated, with the Chilean market emerging in part due to its newly opened telecom market. However, political factors linger, which may prove troublesome as more users get connected.

Mexico's telecom market is still in the process of opening. However, increased influence from major telecom players such as Concert (a BT/MCI Communications Corp. joint venture) look to stimulate growth. The passage of the North American Free Trade Agreement and the increased number of maquiladoras — U.S.-oriented manufacturing plants a stone's throw across the border — represent a growing opportunity for transnational communications.

But despite their broad-based marketing, these services appear to be driven by transnational corporations for U.S./maquiladoras communications, as opposed to broader consumer use in Mexico.

Meanwhile, Costa Rica appears to be the least regulated area. But there is considerable North American influence, and a good technical infrastructure is in place. Costa Rica's relatively lax regulations are indicative of its higher Internet connectivity potential.

In all, telecom deregulation, the social/political climate and the potential proliferation of wireless networks will dictate the pace and direction of Internet growth in Latin America. The potential is high, but growth will be shaped by those many factors.

Ryder is chief analyst at Zona Research, Inc., a Redwood City, Calif.-based consultancy that recently examined the number of Internet-capable seats, registered domains and ISPs in Latin America. He can be reached at cryder@zona research.com.
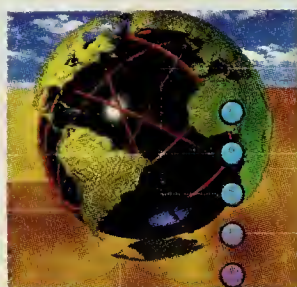
The Network 25

COMPANY, LOCATION, WEB SITE ADDRESS	IS BUDGET	NETWORK BUDGET	AUDIENCE FOR WEB SITE: INSIDE OR OUTSIDE COUNTRY
ARGENTINE BEVERAGES DIVISION; ARGENTINA (no Web site)	$4.3M	$1.3M	Not applicable
ARGONNE NATIONAL LABORATORY; U.S. www.anl.gov	$18M	$11M	Inside
ATRAXIS AG; SWITZERLAND www.atraxis.com	$135M	$35M	Inside
BANCO BRADESCO SA; BRAZIL www.bradesco.com	$383.4M	$61M	Inside
BENETTON SPA; ITALY www.benetton.com	$14M	$3.5M	Outside
BRITISH PETROLEUM; U.K. www.bp.com	$500M	$90M	Outside: U.S., Europe, Australia
CASINO WINDSOR; CANADA www.windsornights.com	NA	NA	Outside: U.S.
CEMEX SA DE CV; MEXICO www.cemex.com	$40M	$25M	Outside: 37 countries
COMPANHIA VALE DO RIO DOCE; BRAZIL www.cvrd.com.br	$17.8M	$17.5M	Outside: U.S., Canada, Europe, Japan
CSX CORP.; U.S. www.csx.com	$500M	$170M	Both; Canada, Mexico, Brazil, Germany
THE EQUITABLE COMPANIES, INC.; U.S. www.equitable.com	$96M	$31M	Inside
FIRST NATIONAL BANK OF SOUTHERN AFRICA www.fnb.co.za	$134.8M	$22M	Inside
FLORIDA POWER AND LIGHT CO.; U.S. www.fpl.com	$157M	$27.6M	Inside
HONGKONG AND SHANGHAI BANKING CORP. www.hsbcgroup.com	$1B	$140M	Outside: 90 countries
MERITA BANK; FINLAND www.merita.fi	$100M	$15M	Inside
NATIONAL UNIVERSITY OF SINGAPORE www.nus.sg	$9M	$2M	Inside
PETROBRAS SA; BRAZIL www.petrobras.com.br	$275.7M	$131.6M	Inside
THE PROGRESSIVE CORP.; U.S. www.auto-insurance.com	$96.6M	$16M	Inside
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SAMSUNG ELECTRONICS CO.; KOREA www.samsungelectronics.com	$3.75B	$1.3B	Inside
SKODA AUTOMOBILOVA A.S.; CZECHOSLOVAKIA www.skoda-auto.cz	$18.6M	$4.7M	Inside
SMITHKLINE BEECHAM PLC.; U.K. www.sb.com	$600M	$75M	Both; 135 other countries
START INFORMATIK GMBH; GERMANY www.start.de	$100M	$50M	Inside
STOCKHOLM HEALTH CARE AUTHORITY; SWEDEN (no Web site)	$3M	$2M	Not applicable
THE TIMES OF INDIA GROUP; INDIA www.timesofindia.com	$10M	$4M	Outside: U.S., Europe

ALL BUDGET FIGURES ARE FOR 1996

An international compendium of network-savvy organizations

NETWORK STAFF	TOP 2 SPENDING PRIORITIES IN '96 (AND PERCENT OF BUDGET SPENT ON THEM)	FOR INTERNET USE:			
		UPGRADED SERVERS	UPGRADED NETWORK PLUMBING	MIGRATED TO TCP/IP	EMBRACED FAST ETHERNET, ATM
15	LANs (45%), WANs (30%)	★	★		
40	LANs (34%), switching (28%)	★	★		
61	WANs (72%), voice (14%)	★	★	★	
139	WANs (65%), LANs (12%)	★	★		
10	Global networking (40%), LANs (30%)			★	★
20*	Voice (60%), LANs and WANs (10% each)	★	★	★	★
3	Network management (70%), LANs (15%)	★			
43	Internet/intranet (20%), LANs, WANs (15% each)				
105	LANs (37%), network management (20%)	★	★	★	★
350	WANs (26%), LANs (16%)	★	★	★	★
85	LANs (39%), WANs (25%)	★	★	★	★
129	LANs (40%), WANs (26%)				
164	LANs (23%), network management (23%)				
450	WANs (50%), voice (30%)				
30	WANs (65%), LANs (15%)	★		★	
10	LANs (28%), switching (18%)	★	★	★	★
756	WANs and global networking (65%), LANs (9%)	★	★	★	★
110	Network management (35%), switching (28%)	★	★	★	
50	WANs (35%), LANs (30%)	★	★		
83	Internet/intranet (47%), other (16%)		★	★	★
45	Switching (24%), Internet/intranet (19%)		★	★	
160	LANs (13%), WANs (12%)	★	★	★	★
40	WANs (90%), network management (5%)				
15	LANs (30%), Internet/intranet (30%)	★	★		
50	WANs (50%), LANs (20%)		★		

*PLUS OUTSOURCERS

NO CATEGORIES MARKED MEANS "OTHER" NETWORK IMPACTS EXPERIENCED

EDITORIAL INDEX

Companies in our issue*

* PAGE NUMBERS REFER TO PAGE ON WHICH STORY BEGINS

The Intelligent Store:

The POS Network you can't Outgrow

"With 3Com's networked POS solution, we cut credit authorization times by half. Our new networked applications allow our store associates to better serve the customer."

— Robert Notte,
Director, IS Operations, Gymboree

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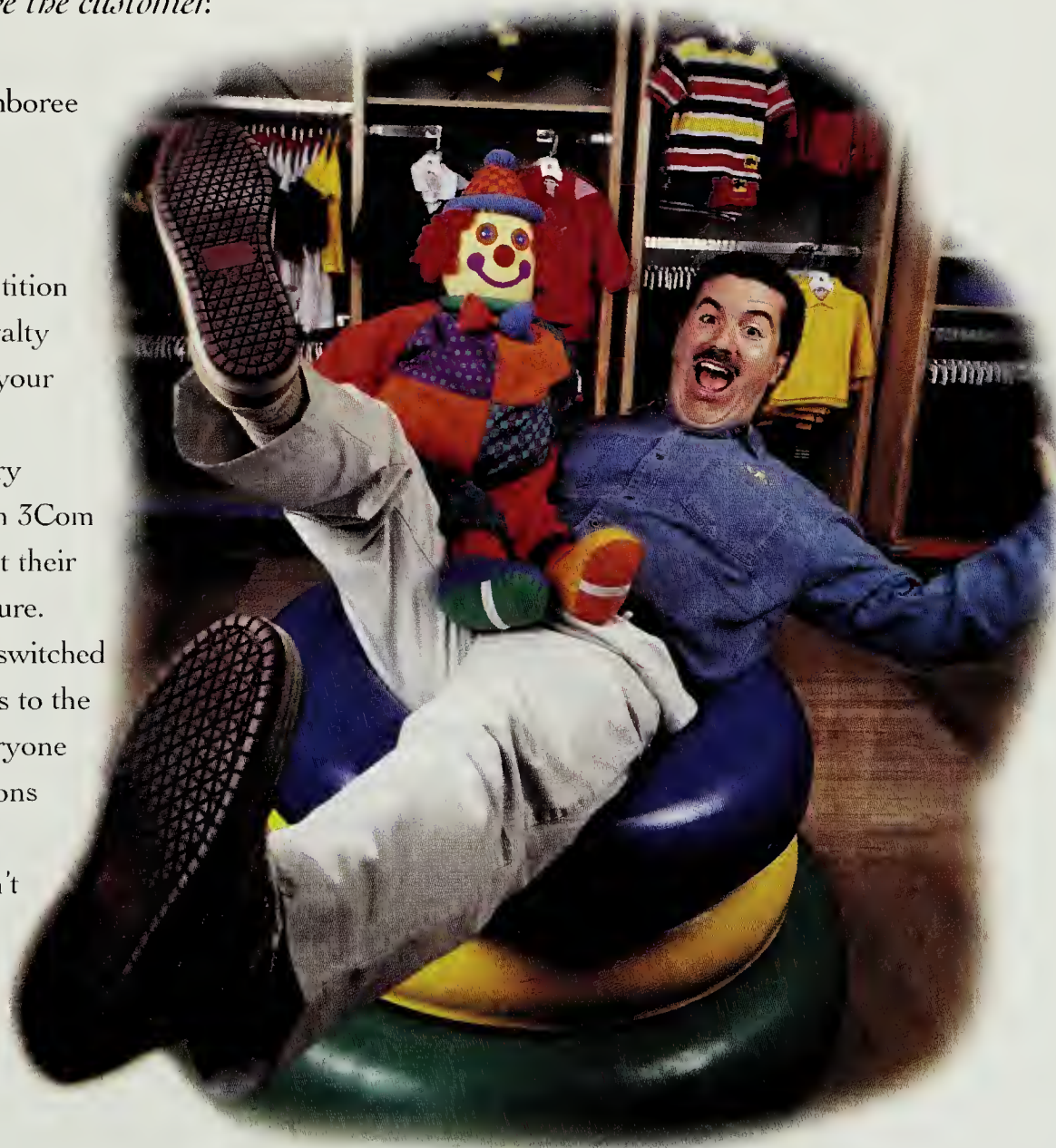
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3Com Benelux B.V.

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Vancouver
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3Com France
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3Com GmbH

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3Com Ireland
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3Com Latin America

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3Com Northern Latin
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3Com Mediterraneo

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3Com Middle East
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3Com Southern Africa
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3Com UK Ltd.

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